



THE CITY OF SPRINGFIELD MISSOURI

NPDES Storm Water Permit Annual Report
July 2003 – June 2004



National Pollutant Discharge Elimination System
Municipal Separate Storm Sewer System
Permit MO-0126322

Prepared by:
Storm Water Services Division
Department of Public Works
December 2004

Signatory Requirements

As required in Part VI.H of NPDES Permit MO-0126322, all reports for the Permit shall be signed by:

- Either a principal executive officer or ranking elected official

Any person signing documents under this section shall make the following certification:

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.”

Tom Finnie
City Manager

Date

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Quality Ozark Streams (City Utilities insert)

Front Porch News – Quality Ozark Streams

Storm Water Hotline, Web Page, and Annual Report (*CEE* Spring 2004 newsletter)

Local Developer Contributes to Good Water Quality (*CEE* Spring 2004 newsletter)

Activity Announcements:

- Storm Water Quality: Discussing Springfield's Urban Runoff (Chamber of Commerce)
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- Letter to Auto Industry Facilities

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1.0 Introduction

This report documents the continued evolution of Springfield's Storm Water Management Program and activities related to the City of Springfield's (City) National Pollutant Discharge Elimination System (NPDES) Permit MO-0126322 issued by the Missouri Department of Natural Resources for the City's Municipal Separate Storm Sewer System (MS4). This Permit covers a five-year period from July 26, 2002 through July 25, 2007. This annual report provides the necessary documentation to fulfill the reporting requirements specified in Part V.D of the Permit for the second year of the Permit from July 1, 2003 through June 30, 2004. This report also serves as an overview of the significant activities implemented by the City to enhance water quality from the MS4. The City's Storm Water Services Division of Public Works compiled this report with assistance and input from Public Works Engineering, Operations, Sanitary Services, Solid Waste Management, and Street Maintenance divisions, along with the Springfield Fire Department, the Springfield-Greene County Parks Department, and the Missouri Department of Transportation.

2.0 Contacts List

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Department of Public Works
Storm Water Services Division

Mission

The Storm Water Services Division is committed to the advancement and continuous improvement of the quality of life for the citizens of Springfield by being a leader in the development of storm water solutions to meet the needs of the community and by placing the welfare and safety of the public above all other considerations.

This will be achieved through:

Quality Customer Service

By being prompt and courteous in responding to all service requests with a professional approach and a meaningful and helpful resolution.

Effective Communication

By taking the initiative to communicate openly with the public and to effectively communicate with neighborhoods on important local issues.

Cooperation with Partners

By developing partnerships with other organizations, groups and individuals with similar objectives and cooperating with those partners to increase the program effectiveness.

Education and Advancement

By being a recognized leader in public education by increasing community understanding of storm water priorities and goals.

Leadership and Excellence

By taking a leadership role in developing a model program through the utilization of advanced innovations and a commitment to excellence.

3.0 Storm Water Management Program Evaluation

A primary objective of Springfield's Storm Water Management Program (SWMP) is the implementation of **Best Management Practices** (BMPs) to protect and enhance the water quality of the MS4. The SWMP elements required in year two of the Permit have been implemented and are discussed in the Narrative Section of this report. The SWMP includes additional elements, which are highlighted below. These accomplishments have made a significant contribution towards enhancing the water quality of the region through sound storm water management principles.



Floodplain Acquisition Program

Following the 1993 floods, a Citizens Storm Water Committee was appointed by City Council to review Springfield's Storm Water Management Program. A primary recommendation of the Committee was the adoption of a Floodplain Acquisition Program to acquire flood-prone properties and undeveloped acreage within sinkhole boundaries and along riparian corridors. In 1993, the City began its Floodplain Acquisition Program. This proactive program has been instrumental in securing floodplains for greenspace uses especially along key riparian corridors. The public has benefited in terms of flood control, wildlife habitat,

recreational uses, and enhanced water quality as a result of this program. The preservation and restoration of natural vegetation within the floodplains reduces erosion and serves as a filter to remove sediment, nutrients, and other pollutants from storm water. In addition, the preservation and expansion of buffer areas adjacent to sinkholes serves to protect groundwater quality. The City's sinkhole protection ordinance (City Code Sec. 96-6) restricts development in sinkholes, preventing the creation of new flooding problems while providing downstream water quality benefits. An important tool for implementing BMPs near sinkholes is the *Springfield Area Watersheds and Sinkholes* map. This map (included in Appendix A) shows the boundaries and watersheds of approximately 250 sinkholes that cover an area of over 600 acres. The City has expended approximately \$9.3 million in Floodplain Acquisition Program funds since 1993. The City acquired the following properties during year two:

- ▶ 2 flood-prone properties within the ponding area of the Kirkwood Park sinkhole
- ▶ 1 flood-prone property as part of a storm water improvement project to construct an open channel in the natural drainageway between McDaniel and Cherry Streets.
- ▶ 2 flood-prone properties within the ponding area of the Fort & Catalpa Sinkhole
- ▶ 5 properties within the FEMA floodplain to construct storm water improvements on the North Branch of Jordan Creek.
- ▶ 1 flood-prone property in the Erie sinkhole area as part of a storm water improvement project to reduce potential flooding
- ▶ 1 flood-prone property as part of a storm water improvement project to reduce potential flooding along Fassnacht Creek



Figure 1 - Ozark Greenways trail along the riparian corridor of South Creek

The City has submitted an application for a FEMA flood mitigation grant to install a larger box culvert under Kansas Expressway at Sunset Street to take approximately 40 houses out of the proposed floodplain. The City has also submitted a Notice of Interest to FEMA to apply for a flood mitigation grant to acquire homes in floodplains and sinkholes.

Capital Improvements Program

The citizens of Springfield have placed a high priority on improving quality of life through flood control and water quality enhancements. Voters approved storm water bond issues, funded through a Level Property Tax, in 1995, 1999, 2001, and 2004. The 2004 initiative also included funding for BMPs, storm water quality enhancements, and stream bank stabilization projects. These bond issues have provided a total of \$56 million for capital projects and floodplain acquisitions. Storm water improvements funded through bond issues and other sources have evolved from a single-purpose flood control objective to multi-purpose facilities that provide water quality enhancement, wildlife habitat, and recreational benefits in addition to flood control. Public-private and public-public partnerships have also been instrumental in the advancement of multi-purpose facilities. Partnership projects summarized in last year's report included:

- ▶ Stream channel stabilization, detention basin upgrades, algae management measures and other BMPs as recommended in the *Southern Hills Lakes Preliminary Evaluation and Management Plan: Summary Report* prepared by Wright Water Engineers, Inc.
- ▶ Construction of a regional detention basin that serves as a flood control facility while providing recreational opportunities at the Jones Family YMCA on Republic Road
- ▶ Construction of a regional detention basin in partnership with Southwest Missouri State University to reduce downstream flooding. The design converted existing impervious area into greenspace.

The following partnership projects were completed during year two:

- ▶ In a cooperative project between the City and the Southern Hills Neighborhood Association, algae management measures were continued in the north lake.
- ▶ Dayton/Montclair – Improvements were made to protect several houses and yards from flooding.
- ▶ Grand Place Addition – The City donated a floodplain acquisition property to the developer for use as detention.
- ▶ Shyanne Estates – The City constructed off-site drainage improvements in cooperation with the developer
- ▶ Le Forte Subdivision – The City constructed off-site drainage improvements in cooperation with the developer

In addition, the following capital projects providing water quality benefits were also completed during year two:

- ▶ The box culvert under Division Street on the North Branch of Jordan Creek was replaced and a section of channel wall was constructed to provide bank stabilization immediately upstream and downstream of the box.
- ▶ A low-flow channel was constructed in a regional drainageway in the South Dry Sac watershed to mitigate channel erosion.



Figure 2 – Channel erosion in a regional drainageway in the South Dry Sac watershed



Figure 3 – Low-flow channel constructed to correct erosion and improve drainage

Jordan Creek Feasibility Study

In the spring of 2004, the US Army Corps of Engineers began a feasibility study to identify cost-effective alternatives to mitigate long-standing flooding concerns and to advance environmental restoration along Jordan Creek. Many businesses in the Jordan Creek floodplain experienced damages from the flood that occurred on July 12, 2000. In addition to flood mitigation, alternatives could also address failing infrastructure and other factors to protect water quality in Jordan Creek. The feasibility study will result in a recommended plan for capital projects that will undergo an approval process and subsequent construction. The City is assisting the Corps through a 50/50 cost share agreement with local matching funds and in-kind tasks. The cost of the study is \$3 million and will take an estimated 4 years to complete.



Figure 4 – Flooding of Chestnut Expressway on July 12, 2000



Figure 5 – Failing infrastructure in the Jordan Creek channel

Flood Hazard Mapping

As referenced in last year's report, FEMA floodplain areas along South Creek, Jordan Creek, and Galloway Creek have been remapped and are currently under review as part of a Cooperative Technical Partner agreement with FEMA in which floodplain remapping will be a cooperative effort that utilizes best available information and technology. The City is also developing City Flood Hazard Maps for flood-prone areas that are beyond the designated FEMA flood boundaries. As part of this effort, approximately 4.9 miles of the Inman Creek watershed was mapped in year one. Additional floodplain and flood hazard mapping is scheduled on a priority basis.

Watershed Assessments

The City continues to lay the groundwork for comprehensive Watershed Master Plans. In year two, the City implemented a watershed assessment approach to creating flood hazard maps. Using this approach, a series of maps is created for a watershed showing the soil properties, current land use, projected future land use, and flood hazard boundaries. An interactive flood map is created that provides an instantaneous look at flow rates at various points within the watershed. Also as part of the assessment process, maps of stream buffers are being created for use in encouraging the implementation of stream protection buffers for new developments. The City is evaluating the implementation of stream buffers to protect water quality while allowing properties reasonable space for development. In year two, the first assessments using this prototype were completed for the Jordan Creek North Branch and Inman Creek watersheds.

Vision 20/20 Water Quality Planning Group

In early 2003, the City and Greene County initiated an effort to update the Vision 20/20 Comprehensive Plan by developing a Strategic Plan for the next five years that "...identifies priorities and establishes responsibilities for carrying out the actions needed to implement recommendations of the plans." The citizen-based Planning Groups began meeting in June 2003. The *2004 Vision 20/20 Strategic Plan for Springfield and Greene County* containing the groups' recommendations was presented to the City and County on June 24, 2004. The recommendations of the Water Quality Planning Group reflected strong community support for storm water management and other water quality issues. The *Plan* is currently undergoing the review and public hearing process necessary for adoption by the City and County. If adopted, the recommendations of the Water Quality Planning Group will be used as a guide for developing policies to address water quality issues.

Storm Water Drainage Criteria Revision

The City has contracted with Wright Water Engineers and Intuition & Logic to update the City's storm water drainage criteria with 2004/2005 approval dates expected. This effort is anticipated to enhance the City's usage of storm water BMPs to protect water resources while providing flood control.

Habitat for Humanity LID Subdivision Project


Greene County is working with Habitat for Humanity (HFH) on a cooperative project in which the County is providing the site design of a new HFH subdivision to demonstrate low impact development (LID) concepts to minimize storm water runoff and protect water quality. The City's Public Works Department is providing technical assistance on the design and landscaping of the subdivision. The Show-Me Yards & Neighborhoods (SMY&N) program is providing technical assistance for the subdivision to meet the program requirements for certification. The project will provide hands-on experience for City and County staff on the practical application of LID concepts and will be a demonstration that can be used when working with other private developers in the future.


Watershed Center


Plans are underway for the Watershed Center, an education and demonstration facility, at the Valley Water Mill site in north Springfield. The Valley Water Mill Task Force, formed in 2000 as a part of the Watershed Committee of the Ozarks (WCO), has developed a concept plan that includes outdoor classroom “learning stations”, trails, a restored wetland, a losing stream, examples of karst geology, native planting areas, an Audubon Society viewing area, a Mo. Department of Conservation Center fishing dock, and a comprehensive on-site wastewater treatment training center. The Springfield-Greene County Park Board will also offer their Outdoor Recreation ~Initiatives program at the Center. In December 2003, the Valley Water Mill Task Force Education Sub-Committee drafted an education plan for the Center that includes demonstrations and workshops on storm water BMPs, the Show-Me Yards & Neighborhoods Program, low-impact development, and sediment and erosion control.


In April 2004, the WCO completed two miles of trails at the site and organized a tree planting and streambank stabilization project on private property just upstream of the reservoir. Beginning in summer 2004, the WCO will be contracting to remove sediment from the lake and construct a wetland in its upper end that will help filter runoff from the developing watershed upstream while serving as a demonstration. Development of a detailed site plan for the Center is currently underway. The Center will assist the WCO's financial sponsors, including the City, in meeting their water quality education goals.

Major Findings

 Watershed master planning is a valuable tool to provide guidance in meeting program objectives of flood control and water quality. The City continues to lay the groundwork for comprehensive Watershed Master Plans through watershed assessments and flood hazard mapping.

 Voluntary efforts by businesses and citizens to implement BMPs are an extremely valuable part of a successful storm water management program and should continue to be encouraged through public education and outreach. In an article titled *Local Developer Contributes to Good Water Quality*, the City recognized the efforts of a local developer to inquire about and implement BMPs on the proper disposal of waters from power washing. The article as it was published in the *Choose Environmental Excellence* Spring 2004 newsletter is included in Appendix C. The article was also published in the *Springfield News-Leader* Ozark Voices section, the *Missouri Municipal Review* and the *APWA Reporter*.

 Mapping of the MS4 has proven to be a valuable tool for illicit discharge investigation, development of the Field Screening Program, watershed planning, and other storm water management activities. Mapping of the entire MS4, which is estimated to involve approximately 47,000 features, will take several years with current resources. During year two, 10.22% of the MS4 was mapped, bringing the total mapped to 23.1%. Statistics on the inventory are included in Appendix B.

 Sampling results from years one and two for the Representative Monitoring Program exhibit some preliminary trends. The results for year two are shown in Table 9 and discussed in Section 6.3.3 of this report.

- ▶ In 6 out of the 8 samples taken during years one and two, South Creek has had the highest levels of total phosphorus in comparison with the other sample sites.
- ▶ Although the wet-weather sampling results did show elevated levels of many parameters when compared to the ambient sampling events in year one, the results for year two for the wet-weather event were generally lower than the ambient sampling event results.

Program Strengths

The 2002-2003 annual report identified several components that continue to be program strengths.

- ◆ Since 1993, the citizens of Springfield have continued to demonstrate increased public support for implementation of sound storm water management practices. Voters passed initiatives for storm water funding in 1995, 1999, 2001 and 2004. Water quality has become an increasing priority among citizens and civic leaders, as shown in the five-year update of the Vision 20/20 Comprehensive Plan. The Vision 20/20 Water Quality Planning Group is providing goals and objectives for storm water management in the future.
- ◆ Since 1993, the City has expended approximately \$9.5 million in Floodplain Acquisition Program funds to acquire flood-prone properties and undeveloped acreage within sinkhole boundaries and along riparian corridors. The preservation of riparian corridors and the adjacent floodplains is basic to meeting our community's water quality, flood control, wildlife habitat, greenspace, and recreational needs and expectations.
- ◆ Since 1995, the City has committed approximately \$15 million to a comprehensive Infiltration and Inflow (I/I) Program. The I/I Program reduces the incidence of sanitary sewer overflows into the storm water system through a proactive Sewer System Evaluation Survey. The Sewer System Evaluation Survey was completed system-wide in June 2003. The City is continuing rehabilitation of the system. Since 1996, approximately 60,908 lineal feet of sanitary sewer lines and over 11,855 manholes have been rehabilitated. Wet-weather sanitary sewer overflows have significantly decreased in both frequency and duration. Ten percent of sanitary sewer revenues are earmarked to finance ongoing I/I efforts.
- ◆ The City continues to offer comprehensive education and public outreach programs on water quality issues through a variety of components summarized in Section 5.10 of this report, including:
 - ▶ Displays and presentations at community events
 - ▶ Presentations and workshops for area school groups and other audiences
 - ▶ Distribution of informational materials through mailings and handouts
 - ▶ Websites for the City's Storm Water Services and Solid Waste Management Divisions and the Show-Me Yards & Neighborhoods Program
 - ▶ Partnering with an outstanding network of individuals, agencies, and organizations, which includes the Watershed Committee of the Ozarks, James River Basin Partnership, Missouri Dept of Conservation, Missouri Dept of Natural Resources, and Natural Resources Conservation Service.

Additional program strengths identified in year two are summarized below:

- ◆ The City has made proactive efforts to address industrial and commercial discharges to the storm water system. Guidelines concerning the discharge of wash waters were mailed to approximately 450 businesses in the automotive dealer, repair, and cleaning industries. Letters were also sent to 182 facilities that do not have an NPDES storm water permit but may be required to have one. This mailing resulted in 9 facilities applying for permits and 33 facilities applying for exemption status. A site visit by MDNR personnel is required to verify exemption status.
- ◆ The Bridge & Waterways Section of Public Works provides prompt attention to storm water system maintenance needs, in response to both citizen and internal requests. Maintenance recommendations for 16 city-owned detention basins resulting from the inspections program established in year two were completed within 2-3 weeks of inspection. The inspection results are shown in Table 2. The Bridge & Waterways section has also provided invaluable assistance in tracking the sources of non-storm water discharges.

- ◆ Southwest Missouri has demonstrated broad base support for protection of water resources due in large part to the strong connection between water resources, the tourism industry and quality of life in the Ozarks. This support is evident in the outstanding network of organizations, agencies, and individuals that contribute to water protection efforts and through coverage of water quality issues by the local media including the *Springfield News-Leader* (i.e. Stewardship Ozarks series as well as regular coverage of local water quality news), TV networks, and other local publications.

Program Weaknesses

In May 2003, Mr. Jonathan Jones, P.E., of Wright Water Engineers, Inc. in Denver, Colorado, provided City Council with an evaluation of Springfield's Storm Water Management Program from a national perspective. While the evaluation ranked the program favorably, it targeted areas for improvement to strengthen the program in the future. In addition to successfully administering and complying with the requirements of the Permit, Mr. Jones' priority recommendations included:

- ▶ Increase permanent funding for system maintenance, staffing, administration and operations.
- ▶ Initiate high-priority watershed planning.
- ▶ Develop a comprehensive drainage criteria manual.
- ▶ Obtain authority to require grading plan in development submittal process.
- ▶ Implement Pierson Creek, South Dry Sac and sinkhole water quality requirements citywide.
- ▶ Enact ordinances regarding adoption of drainage criteria manual and master plan, and provide City authority to require grading permit.
- ▶ Increase public education and involvement, in general.
- ▶ Continue to improve water quality, especially in the James River Basin.
- ▶ Continue to prepare detailed flood hazard maps.
- ▶ Evaluate and, following a screening process, propose a permanent funding source for the storm water program, potentially in combination with Greene County. This would likely be a storm water utility.
- ▶ Implement pilot projects regarding new storm water and stream channel management practices, such as "low-impact development" and "bioengineering" for stream channel stability.
- ▶ Continue acquisition of flood-prone structures and preservation of riparian corridors.
- ▶ Encourage multi-purpose facilities that are valuable community assets, like the YMCA detention basin, including partnerships to create such facilities.
- ▶ Adopt a more proactive approach to erosion control at construction sites, emphasizing education.

Many of these targeted areas are being addressed within current budgetary and staffing limitations.

- ▶ The City participated in the development of the Vision 20/20 Comprehensive Plan released in June 2004 that emphasized the need for a dedicated funding source for storm water. The City will continue participation in the ongoing community discussions to identify a permanent, dedicated funding source for storm water.
- ▶ The City continues to lay the groundwork for watershed planning through development of enhanced flood hazard maps, watershed assessments, mapping of the storm water system citywide, and mapping of buffers along waterways. These efforts are discussed in Section 3.0 SWMP Watershed Assessments.
- ▶ Development of a comprehensive storm water drainage criteria manual is currently underway. The City has contracted with consultants to complete the manual in 2005.
- ▶ Consistent with the recommendations of the Vision 20/20 Water Quality Planning Group, the City is evaluating the benefits of adopting the water quality requirements for the Pearson Creek, South Dry Sac and sinkhole watersheds on a citywide basis.

- ▶ Public education and involvement is continually increasing as the City's Storm Water Management Program expands. Section 5.10 of this report summarizes the City's education efforts.
- ▶ The City is continuing to develop detailed floodplain maps as well as flood hazard maps for areas beyond the designated FEMA boundaries. These efforts are discussed in Section 3.0 Flood Hazard Mapping.
- ▶ The City is providing technical assistance to implement low-impact development concepts on the design of a new subdivision in Greene County. The Show-Me Yards & Neighborhoods program will be providing technical assistance on the landscaping design and lawn care practices for the development.
- ▶ Channel improvements are being planned for year three on Fassnight Creek and the North Branch of Jordan Creek using bioengineering concepts.
- ▶ The City continues to acquire flood-prone properties and undeveloped acreage within sinkhole boundaries and along riparian corridors as summarized in Section 3.0 Floodplain Acquisition Program.
- ▶ The City continues to explore opportunities to create multi-purpose facilities. Partnerships to construct storm water improvements in year two are discussed in Section 3.0 Capital Improvements Program.
- ▶ The City is working to adopt a more proactive approach to erosion control at construction sites. To initiate discussions on this approach, a meeting of City personnel from several divisions of Public Works was held in April 2004 in conjunction with an APWA webcast on the subject. Also in April, City personnel gave presentations on erosion & sediment control at a seminar for developers and regulators hosted by area companies. A workshop for construction site operators is planned for the third permit year.

Future Direction of the SWMP

- ◆ The following activities are scheduled for implementation in year three, as required in Part III.A of the Permit. The implementation of these activities is in addition to ongoing activities implemented as required in the years one and two.
 - ▶ Evaluate existing major flood control facilities for retrofitting with storm water quality controls
 - ▶ Implement standard procedures for investigation of storm water and non-storm water discharges
 - ▶ Implement self-monitoring program for high-risk facilities
 - ▶ Begin biological stream assessment program
- ◆ Activities implemented as required in years one and two are ongoing throughout the permit period. These activities undergo further development as needed and based on available staff and funding resources. The following activities implemented in years one and two will undergo further development in the year three:
 - ▶ An erosion and sediment control workshop is planned to provide education for construction site operators.
 - ▶ Consideration will be given to expanding the inspection program for storm water quality control structures to include major privately-owned water quality detention basins.

◆ Additional activities are planned year three that are considered important to the SWMP but are beyond the scope of the Permit. These activities are contingent upon available resources.

- ▶ It is anticipated that a network of rain gauges will be installed to supplement precipitation data from the National Weather Service station at the Springfield-Branson Regional Airport. The additional data will aid in determining qualifying rain events for wet-weather sampling and will enhance the accuracy of estimates for the wet-weather sampling discharge volume and for the total annual volume of urban runoff discharges.
- ▶ It is anticipated that storm water quality data will be obtained from the utilization of automatic samplers.
- ▶ Updating of the City's storm water drainage criteria manual will continue. The process is being implemented in conjunction with the presentation and adoption of recommendations from the Vision 20/20 Water Quality Planning Group.
- ▶ Preparation will continue on a city flood hazard atlas to aid in identifying flood-prone areas for the Floodplain Acquisition Program.
- ▶ Watershed assessments will continue on a priority basis.
- ▶ Mapping of buffer areas along streams will continue and consideration will be given to implementing stream protection buffers in new developments.

4.0 SWMP Summary Table

Table 1 has been prepared according to the format outlined in Part V.D.2.c. of the Permit. The Summary Table documents program activities that are quantifiable. Some activities could not be quantified and therefore do not appear in the Summary Table but are discussed in Section 5.0 Narrative Report.

Table 1 - Storm Water Management Program Summary Table

Task	Required Schedule	Schedule Adhered?	Activities Accomplished	Available Documentation & Comments
MS4 Inventory	Existing schedule (1 FTE)	Yes	10,871 structures or 23.1% of estimated total	Section 5.1, Activity 1.a; Appendix B
Inspections of MS4 quality control structures	Periodic	Yes	23 city-owned basins inspected in March	Section 5.1, Activity 1.b
Floatables removal (grate inlets, waterways, bridge, and sinkhole routes)	Existing schedule (As needed)	Yes	12,725 locations cleaned;	Section 5.1, Activity 1.c
Cleaning roadway inlets and catch basins	Existing schedule (As needed)	Yes	Southern Hills catch basin cleaned biannually; Cleaning inlets not tracked	
Street Cleaning	Existing schedule (weekly/bimonthly)	Yes	1,455 tons of debris and 2954 cubic yards of leaves collected	Section 5.3, Activity 3.b
Dry-weather field screening	50 points/year	Yes	75	Field Data Sheets; Section 5.7, Activity 7.b
Wet-weather field screening	25 points/year	Yes	28	Section 5.7, Activity 7.b
Illicit Discharge Investigation	As needed	Yes	27 reports (1 requiring ESRT)	Section 5.7, Activity 7.d
Infiltration and Inflow Program	N/A	N/A	19,731 lineal feet of sanitary sewer lines and 1413 manholes rehabilitated	Quarterly reports to MDNR; Section 5.7, Activity 7.g
Representative Monitoring (Stream Sampling)	6 sites 4 times/ year	Yes	6 sites 4 times/year	Section 6.3, Table 9.
Education	N/A	N/A	1 City Utilities bill insert 200 storm drain markers 1 water education festival 22 presentations 10 displays 8 workshops/seminars	See Section 5.10 for full summary of activities
Tree Planting	N/A	N/A	714 trees	Planted on public property, including parks

5.0 Narrative Report

The purpose of this section of the report is to discuss those SWMP elements required for development under Parts II and III of the Permit. The activities for each element are identified with their corresponding number and letter listed in Part II.A of the Permit.

5.1 – Operation and Maintenance of Structural Controls

Activity: *1.a - Continue to update and maintain the inventory data for the MS4 within the City boundaries.*

The City currently has one full-time employee assigned to inventory and map the MS4. The inventory data includes seven major components in two categories:

- ▶ Linear Features
 1. Pipe
 2. Box Culvert
 3. Channel
- ▶ Point Features
 4. Inlet
 5. Junction Box
 6. Detention Basin
 7. Bridge

These point and linear features are identified through the use of construction plans and aerial photography, as well as field verification and other documentation available. These features are digitized with the use of GIS software. Information about these structures is recorded in a corresponding database. This inventory data will assist the City in investigation of spills and illicit discharges in addition to being a useful tool for maintenance activities and watershed planning. Statistics on the inventory completed in year two are included in Appendix B. Sinkholes within the City have also been mapped with the use of GIS software and represent an eighth feature type in the MS4. The *Springfield Area Watersheds and Sinkholes* map is included in Appendix A.



Figure 6 - Digital mapping of the storm water system

Activity: *1.b - Develop and implement a program for periodic inspections of the storm water quality control structures.*

A program for inspections of storm water quality control structures was developed and implemented in year two. Structures included in this program are city-owned detention basins and catch basins. The City currently owns and maintains 22 detention basins and one catch basin, located above the north lake in Southern Hills neighborhood. The basins were inspected in March to identify maintenance needs prior to the onset of the wet-weather season. Basins were inspected for:

- ▶ Structural condition
- ▶ Vegetation condition
- ▶ Trash/debris (including sediment or gravel deposits)

Table 2 shows the inspection results and maintenance completed on each basin. The inspections will be conducted on an annual basis. Consideration will be given in the future to increasing the frequency of inspections and expanding the program to include major privately-owned water quality basins. Expansion of the program is subject to available resources.

Table 2 – Detention Basin Inspection Results

Basin #	Structural Condition	Vegetation Condition	Trash/debris/deposits	Maintenance Needs
1	Crack in 21" RCP	Good	Trash	Repair pipe seam & remove trash
2	Good	Good	None	None
3	Good	Good	None	None
4	Broken blocks at channel discharge	Good	Trash	Repair broken blocks & remove trash
5	Good	Good	Sediment deposits in channel	Remove deposits
6	Good	Good	Trash & sediment/leaf deposits behind weir	Remove trash & deposits
7	Good	Good	Sediment deposits in channel	Remove deposits
8	Good	Sparse areas	None	Reseed areas
9	Good	Sparse areas	Sediment deposits in channel & behind weir	Reseed areas & remove deposits
10	Pipe discharge clogged	Channel bank needs stabilized/reseeded	None	Unclog pipe & stabilize/reseed bank
11	Good	Good	None	None
12	Good	Sparse areas	Mattress & hay bale in front of weir; sediment deposits in front of weir	Remove debris & deposits
13	Good	N/A (Wet basin)	None	None
14	Good	Channel from parking lot needs stabilized	None	Stabilize channel w/ shotrock
15	Good	Good	None	None
16	Good	Sparse areas	Sediment/leaf deposits in channel & in behind weir	Reseed areas & remove deposits
17	Good	Good	Gravel deposits behind weir	Remove deposits
18	Good	Good	Trash	Remove trash
19	Fair – concrete cracking	Sparse areas	Trash & sediment deposits in channel	Reseed areas & remove deposits
20	Good	Good	Sediment deposits in channel	Remove deposits
21	Good	Scouring on side of overflow wall & some sparse areas	Trash & sediment deposits behind weir	Remove trash & deposits
22	Good	Good	None	None
23	Good	N/A (concrete catch basin)	None	None

Activity: 1.c - Continue existing maintenance program by periodic collection and removal of floatables from the MS4 to the Maximum Extent Practicable (MEP).

The Bridge & Waterways Section of Public Works routinely checks and removes debris from the storm water conveyance system after rain events. This scheduled maintenance activity consists of four route types:

- ▶ Bridge route with 10 priority locations
- ▶ Sinkhole route with 12 priority locations
- ▶ Waterway routes, north and south, with 85 priority locations
- ▶ 12 grate routes with over 1700 priority locations

Maps of these routes are included in Appendix A. In December 2003, a new work order system was installed that has enhanced the ability of Public Works to schedule and track maintenance activities. During the period of December 2003 – June 2004, debris was removed at 12,725 locations¹.

The two monitoring locations designated for the removal of floatable materials as required in Part V.B. of the Permit are reported in Section 6.4 of this report.

5.2 – Control of Discharge from Areas of New Development and Significant Redevelopment

Activity: *2.a - Consideration of incorporating Best Management Practices into land development and management activities of the entire area served by the City's MS4.*

In April 1999, City Council passed Resolution #8648 adopting a Water Quality Protection Policy for the Fulbright Spring, Pierson Creek, and sinkhole watersheds. The Policy, which was adopted in accordance with the short-term recommendations of the Water Resources Task Force and the 1995 Fulbright Spring Protection Study, recognizes the sensitivity of these watersheds. The Fulbright Spring and Pierson Creek watersheds are valuable sources for the community's drinking water supply. Due to the karst topography of the region, sinkholes are a direct connection to the shallow groundwater system that supports springs in the area. The requirements of the Policy apply to all new developments in these sensitive watersheds which are shown on the *Springfield Area Watersheds and Sinkholes* map included in Appendix A. The Policy outlines requirements and design criteria for structural BMPs based on the following general design guidelines:

- ▶ Minimize runoff by reducing the amount of directly connected impervious area
- ▶ Maximize contact with grass and soil by directing runoff over vegetative filter strips and grass swales
- ▶ Maximize detention and settling time
- ▶ Design for small, frequent storms
- ▶ Utilize BMPs in series where possible
- ▶ Incorporate both flood control and storm water quality objectives in designs, where practical

Figures 7-9 show a privately-owned extended dry detention basin in the Fulbright Spring protection area that was constructed according to the Policy's design criteria.

The recommendations of the Water Quality Planning Group in the *2004 Vision 20/20 Strategic Plan for Springfield and Greene County* include expanding the requirement for water quality BMPs for new developments to include all watersheds in the City. Staff is recommending this be implemented through the City's storm water drainage criteria manual that is currently being developed. A consultant is under contract to complete the City's storm water drainage criteria manual in 2005. These recommendations will undergo comment from the development community in the next year.

¹ This number includes duplicate locations cleaned more than once during this time period.



Figure 7 – Storm water entering this extended dry detention basin discharges slowly through a gravel filter and perforated riser pipe. Slowing down the discharge rate allows sediment and pollutants to settle and helps prevent downstream erosion.



Figure 8 – Storm water entering the detention basin with a high sediment load



Figure 9 – Storm water discharging from the detention basin with a much lower sediment load

5.3 – Roadways

Activity: *3.a - Review current deicing practices, implementing changes where feasible to minimize the discharge of pollutants to the MS4.*

The City's current deicing practices emphasize providing safe driving conditions on municipal streets while also minimizing the potential for deicing materials to discharge into the MS4. The Street Maintenance Division uses rock salt, liquid salt brine and liquid calcium chloride for deicing the City's streets. The salt is stored in the City's salt dome building to prevent contact with storm water. In year two, construction began on a second salt storage

facility in southwest Springfield. This joint use facility will provide ample salt storage and more efficient maintenance operations for both the City and Greene County.

In 1997, the Street Maintenance Division began researching and experimenting with different application rates for deicing materials. Prior to this time, the Division was using the nationally recommended rate of 500 pounds of rock salt per lane mile. It was determined that an effective level of ice and snow removal for public safety could be provided using a reduced rate of 200 pounds per lane mile. The following practices used by the Division help to provide an effective level of ice and snow removal while minimizing the discharge of salt and calcium chloride to the MS4.



Figure 10 – City salt dome

- ▶ Liquid calcium chloride and liquid salt brine are used to pre-wet the rock salt before it is sent to the spreader. Adding liquid calcium chloride or salt brine to rock salt helps shorten the reaction time of the rock salt and provides melting action at lower temperatures. Pre-wetting the rock salt also decreases the salt "bounce off" effect when the salt hits the road, thereby keeping more salt on the roadway and out of roadside ditches. Salt brine is used to pre-wet the rock salt until the temperature drops to 24°F, below which salt brine is not effective and calcium chloride is used.
- ▶ When the temperature is high enough that precipitation will start as rain before turning to snow, the Division waits until the snow occurs to apply rock salt to the roadway. If rock salt is applied before the rain turns to snow, the rock salt will get washed into the storm water system.

Activity: *3.b - Continue existing street sweeping program*

The Street Maintenance Division sweeps and cleans all curbed streets in the City on a rotating schedule. The curbed streets are divided into 47 routes that cover over 980 curb miles. This activity is accomplished with seven street sweepers that operate 40 hours a week during the day shift and two street sweepers that operate 40 hours a week during the night shift. During an average eight-hour shift, a sweeper can clean approximately 10 curb miles. Arterial roads are swept weekly. Collector roads and residential roads are swept six times per year. In addition, the Division routinely picks up debris such as tires, couches, appliances, and bags of trash that are left on the City's rights-of-way, as well as providing cleanup in response to spills/accidents and special events such as parades. The Missouri Department of Transportation (MoDot) sweeps and cleans state-maintained thoroughfares within the City Limits. During the first permit year, the City's street sweepers collected 1,455 tons of street sweepings and 2954 cubic yards of leaves which were taken to the City's Yardwaste Recycling Center.

Activity: *3.d - Continue routine cleaning of grated inlets, roadway storm water inlets, and catch basins.*

The Bridge and Waterways Section of Public Works administers an established program of cleaning the storm water conveyance system after rain events. This program includes 12 grate routes covering over 1700 storm grates. The grate route work orders include instructions to clean all pipes and inlets along the route. Maps showing the locations of these routes are included in Appendix A.

As defined in Storm Water O&M Fact Sheet Catch Basin Cleaning²,

“Catch basins are chambers or sumps, usually built at the curb line, which allow surface water runoff to enter the storm water conveyance system. Many catch basins have a low area below the invert of the outlet pipe intended to retain coarse sediment.”

There is one catch basin in the City that has the defining characteristic of a low area below the flow line meant to retain sediment and debris. This catch basin, located above the north lake in Southern Hills neighborhood, is cleaned twice per year.

The City’s sub-inlet chambers generally do not collect debris because the bottoms of the chambers are at the same elevation as the flow line. In some cases, debris can accumulate if the pipe outlet becomes clogged. These chambers are cleaned on an as-needed basis.

5.4 – Flood Control Projects

Activity: *4.a – Continue to assess the impacts on the water quality of receiving waters from flood management projects using procedures and criteria established for storm water grant applications.*

The City continues to consider water quality protection in the design of all flood control projects. Major projects along the North Branch of Jordan Creek and Fassnight Creek are scheduled to be designed using bioengineering or “green” engineering techniques during year three.

The following excerpt from *10 CSR 20-4.061 Storm Water Grant and Loan Program* is used for guidance on all storm water projects by the City and must be addressed on applications for state funding for projects.

- ▶ “An evaluation of limited structural approaches to storm water control. The plan must analyze the use of applied geomorphology and bioengineering techniques to manage storm water. Projects that are only rehabilitation or replacement of existing structures will require an evaluation that addresses reasonable geomorphological alternatives and, if this approach is not taken, a brief discussion why not. For more complex projects, the evaluation should follow guidance provided by... The root causes of flooding, bed and bank erosion, and sediment deposition should be addressed in this plan. The plan should not exacerbate these problems by –
 - A. Modifications to stream systems that increase bed and bank erosion in modified stream sections;
 - B. Cause these impacts in sections that are upstream or downstream of the storm management project;
 - C. Remove or degrade aquatic habitat;
 - D. Remove the pollutant removal benefits of vegetated stream corridors; or
 - E. Lead to increased flooding upstream or downstream of the storm water management project. Combinations of measures can be employed to manage storm water and retain important stream functions.

‘Bioengineering’ combines mechanical, biological, and ecological concepts to prevent slope failures and erosion. Bioengineering techniques may use bare root stock, stems, branches or trunks of living plants on eroded slopes. Plantings may be incorporated into such configurations as a live stakings, live fascines, or living cribwall. Vegetative plantings and cuttings may be combined with structural elements such as gabion baskets or rock surface armoring. However, the intent should be to minimize hard structural solutions and allow the rooted plantings to do much of the work to hold the soil in place

² EPA 832-F-99-011, September 1999, United States Environmental Protection Agency Office of Water, Washington.

and retain the natural function of streams to convey storm water. Other storm water management options include environmental easements and land acquisition.”³

The City is currently working with consultants to update the City’s storm water drainage criteria manual. Chapter 1 Storm Water Drainage Policy of the updated manual contains the following principles that address the topics above:

- ▶ An urban storm drainage system should be regarded as a natural resource that serves the community with a multi-objective purpose.
- ▶ Floodplains should be preserved wherever feasible and practicable to maintain naturally occurring storm water storage.
- ▶ Streams and waterway riparian corridors should be maintained as they naturally occur to the maximum extent practicable.
- ▶ Planning and design of storm water drainage systems should not be based on the premise that problems can be transferred from one location to another.
- ▶ A storm water drainage system should be designed, beginning with the point of discharge, giving consideration to downstream impacts and the effects of off-site flows.
- ▶ Design of storm water drainage systems should consider existing natural forms and features.
- ▶ Developments should be designed to reduce runoff rates and pollutant loads to minimize negative downstream impacts to the maximum extent practicable.

Additional chapters in the manual fully address these principles.

5.5 – Program to Monitor Pollutants in Runoff from Municipal Waste Management Facilities that are not Permitted by a Separate Permit

Activity: *5.a – The City will continue to study its municipal waste management facilities and determine if additional BMPs are needed to control pollutants to the MS4 and, if so, develop a schedule for implementation.*

As reported under **Activity 5.b**, there are no active municipal waste management facilities within the City limits. As monitoring at the seven sites discussed in **Activity 5.b** is completed as part of the Field Screening Program, the results will be studied to determine if additional BMPs are needed and a schedule for implementation of these BMPs will be developed.

Activity: *5.b - Establish, as part of the field screening program, a monitoring and inspection program for municipal waste management facilities.*

There are no active municipal waste management facilities within the City limits. As reported in Part I of the application for this Permit, there are four closed landfills within the City limits as well as two fill areas that received demolition debris and possibly some municipal waste. These sites were in operation at various times from the 1920’s through the mid 1960’s. There are also three sites where the City’s early wastewater treatment plants were located. These treatment plants have been closed and/or demolished. Two of the sites are at the same approximate location as two of the closed landfills. Field screening points will be established to monitor the drainage from these areas in forthcoming permit years. The locations are listed below and shown in Figure 11.

³ 10 CSR 20-4.061 Storm Water Grant and Loan Program, Rebecca McDowell Cook, Secretary of State, 2/29/00.

1. Talmage Street City Dump – NW corner of Talmage Street and Benton Avenue
2. Eastgate Landfill (privately owned) – NE corner of Catalpa Street and Eastgate Avenue
3. Loren Street City Dump (and Catalpa Street Treatment Plant) – North side of 2100 block of W. Catalpa Street
4. Bennett Street City Dump (and Wilsons Creek Treatment Plant) – SE corner of Bennett Street and Scenic Avenue
5. Walnut Street Landfill – NW corner of Walnut Street and Fort Avenue
6. National Avenue Landfill (clean fill only - construction materials and concrete) – NW corner of National Avenue and Trafficway
7. Pea Ridge Creek Treatment Plant – North of Doling Park

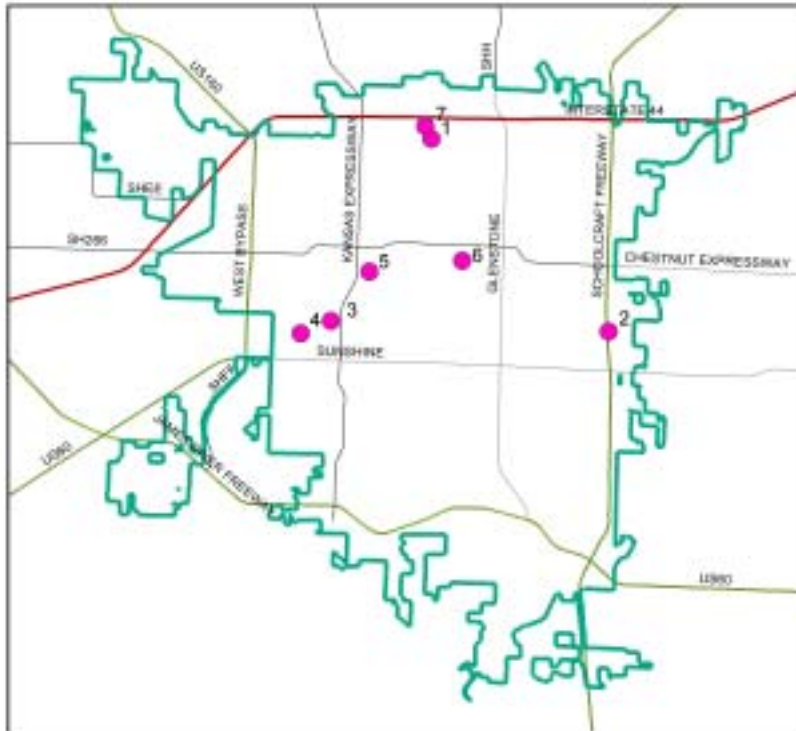


Figure 11 – Sites formerly used for municipal waste or wastewater treatment

5.6 – Use of Pesticides, Herbicides, and Fertilizers (PHFs)

Activity: 6.a - Continuation of public education program to promote the proper use, handling, storage, and disposal of PHFs through the Integrated Solid Waste Management System.

The Solid Waste Management and Storm Water Services Divisions of Public Works provide the public with educational information on the proper use, handling, storage, and disposal of pesticides, herbicides, and fertilizers (PHFs). Information about the Show-Me Yards & Neighborhoods (SMY&N) Program and the Household Chemical Collection Center (HCCC) is featured at local community events, media opportunities and presentations summarized in Section 5.10 of this report. In addition, both the SMY&N Program and the HCCC were highlighted on the *Quality Ozark Streams* flyer included in City Utilities bills distributed to approximately 98,000 customers in October 2002 and 2003. This flyer is included in Appendix C.

- SMY&N education and outreach activities are designed to raise awareness of the significant role lawns play in the total amounts of nutrients and pollutants in storm water runoff flowing to area waterways. SMY&N offers environmentally responsible lawn and landscaping tips, including proper use of PHFs. Individuals and professionals who put the SMY&N techniques into practice are recognized and commended – homeowners can earn an attractive yard sign and professionals can become certified. Professionals have been particularly responsive to the program, with 65 professionals receiving certification. Professionals receive periodic mailings that provide tips, reminders, and other information. The letter mailed to professionals in October 2003 is included in Appendix C. As listed in Section 5.10 of this report, SMY&N presentations and/or displays were provided at a number of community meetings and events, including the Home Show and Lawn & Garden Show with attendance numbers of approximately 19,300 and 17,500 respectively. Two new SMY&N booklets – *Cool Season Grasses Lawn Care & Maintenance Calendar* and a general information booklet referred to as Take Home Tips - were produced in December 2003 and are included in Appendix C. A full revision of the SMY&N webpage was completed in March 2004 at www.springfieldmogov.org/community/cee_showme. The SMY&N Phase II 319 mini-grant from the Missouri Department of Natural Resources was completed in December 2003. The SMY&N program continues with funding and support from Public Works, the Watershed Committee of the Ozarks, and the James River Basin Partnership. SMY&N will be a component of the education program at the new Watershed Center for which plans are underway as discussed in Section 3.0.



Figure 12 – SMY&N sign in a certified yard in Springfield

- The HCCC is available to Springfield and Greene County residents for proper disposal of unneeded household chemicals, including PHFs. The Solid Waste Management Division has produced and distributed a brochure that provides information about visiting the HCCC and guidelines on proper storage and handling of household chemicals. This information is also available on the Division's web page at www.springfieldmogov.org/recycling/housechem.html. A nine-year comparison of the amount of materials collected at the HCCC from its opening in 1994 through year one of the permit ending in June 2003 is included in Appendix B. In year two of the permit, 93,364 lbs. of materials were collected at the HCCC. Of this total, 83% was recycled. A breakdown of the materials recycled as shown on the nine-year comparison was not available for year two of the permit (tenth year of operation for the HCCC) at the time of this report. As reported in the 2004 *Environmental Report Card* for Springfield-Greene County, the amount of material collected and the percent recycled at the HCCC is on an upward trend based on a 5-year mean⁴.

⁴ <http://www.springfieldmogov.org/health>

Activity: *6.b - Review municipal usage of PHFs on public properties and rights-of-ways to determine the effectiveness and feasibility of using alternatives to PHFs*

The Public Grounds Division of Public Works and the Springfield-Greene County Parks Department require that all pesticides, herbicides, and fertilizers (PHFs) be applied under the direct supervision of a Missouri licensed certified public operator as required by state law.

The Public Grounds Division uses herbicides to minimize species that require frequent mowing, particularly on street medians. Fertilizers are typically used only to promote reseeded areas and as part of the lawn care program designed for the Government Plaza. In these instances, a low-nitrogen, low-phosphorous product that focuses on promoting root growth is used. The Division's Grounds Maintenance Crew Leader has completed the Show-Me Yards & Neighborhoods Lawn Care Professionals Certification Program in commitment to environmentally sound lawn care practices, including minimum usage of PHFs.

The Springfield-Greene County Parks Department uses PHFs to maintain City parks according to the usage of the property. Sports fields and golf courses are fertilized to provide an optimal surface for sports activities and to compensate for the physical wear to the grass cover. A pre-emergent herbicide is used on these properties to minimize species that can require more frequent mowing. Pesticides are only used on city parks, golf courses, and sports fields if a persistent pest problem occurs. Usage is limited to the affected area only. The Parks Department does not use any pesticides that are registered with the Missouri Department of Agriculture as Restricted-Use Pesticides. Several Parks Department personnel have also completed the Show-Me Yards & Neighborhoods Lawn Care Professionals Certification Program.

Further study would be needed to determine the feasibility of using alternatives to PHFs to effectively serve the purposes of minimizing maintenance activities and providing optimal conditions for the community's sports activities.

5.7 – Illicit Discharges and Improper Disposal

Activity: *7.a – The City will develop standard procedures for investigation of reports of illicit discharges and for enforcement to prevent such discharges.*

The Storm Water Services Division conducts investigation of illicit discharges and enforcement to prevent such discharges. Investigation is conducted in cooperation with the City's Sanitary Services Division or the Missouri Department of Natural Resources when necessary. The assistance of the Emergency Spill Response Team of the Springfield Fire Department is also utilized when necessary for hazardous materials spill response.

Illicit discharges may be identified through dry-weather screening or wet-weather monitoring activities of the field screening program, or through other water quality monitoring, public reporting, or responsible party reporting. Illicit discharges may be direct or indirect connections and can occur as either intermittent or continuous flows. Examples of illicit discharges include dumping of motor oil, discharges of un-permitted wash waters, infiltration of sanitary sewer discharges, process material spills, and potable water line leaks. Standard procedures for investigation of illicit discharges include the following steps:

1. Substance Identification
2. Source Identification
3. Notification of Responsible Party
4. Abatement
5. Documentation

Substance Identification

If the source of a discharge is not known, substance identification should be conducted to determine the nature of the discharge and aid in source identification. Substance identification of the discharge should begin with assessment of physical properties including color, odor, clarity and sheen. Physical properties may provide sufficient indication of the substance. If physical properties do not provide a clear indication of the nature of the discharge, colorimetric field test kits will be used to determine the presence of chlorine, copper, phenol, and detergents, as conducted for the dry-weather screening component of the Field Screening Program outlined in Part II.A.7.b of the Permit. Temperature, dissolved oxygen, pH, and conductivity readings will be taken using hand-held meters. If necessary to aid in enforcement procedures, a grab sample may be collected and analyzed for the pollutants listed in Part II.A.7.b of the Permit or other pollutants if appropriate.

Source Identification

Procedures used for source identification depend on the nature of the illicit discharge. Procedures are outlined for:

- ▶ Dumping of pollutants in streets, ditches or other areas of the storm water drainage system
- ▶ Continuous or intermittent flows during dry-weather conditions
- ▶ Illicit discharges or pollutant sources indicated by wet-weather sampling results

Dumping

In the case of dumping of pollutants in the storm water drainage system, three scenarios are most likely regarding identification of the responsible party.

1. Responsible party is untraceable
2. Responsible party was indicated by the reporting entity
3. Responsible party is suspected but cannot be verified

If the responsible party is untraceable, cleanup procedures are detailed under Abatement/Enforcement. If appropriate, an informational notice about illegal dumping may be sent to surrounding businesses and residents.

If the reporting entity identified a responsible party, either a business or resident, then a site visit will be conducted if applicable to verify the identity of the responsible party. If identification of the responsible party can be verified, through admittance by the responsible party, evidence identified through a site visit such as possession/use of materials dumped, or other legally defensible means, then a request that the responsible party conduct cleanup will be made.

If the identification of the responsible party is suspected but cannot be verified, information concerning the proper handling and disposal of the dumped material(s) will be provided to the individuals and/or entities in the area that handle the dumped material. This information will include references to City ordinances prohibiting dumping and illicit discharges, and educational information concerning water quality. This information is provided to raise awareness as a means to preventing future illicit discharges. Depending on the situation, this information may be provided through discussions during a site visit or by letter in the format of an informational notice. A letter may be sent to all surrounding residents or similar businesses in the area to improve the odds of providing this information to the responsible party.

Dry-Weather Discharges

In the case of an illicit discharge that is a continuous or intermittent flow observed in the storm water system during dry weather conditions, source identification will include tracing the flow upstream in the system. A map of the drainage basin with aerial photography will be generated showing the mapped areas of the storm water system, 2-ft contour lines, city water and sewer lines, NPDES permitted facilities, and SIC codes of businesses. Starting at the outfall where the illicit discharge daylights, a systematic investigation of the upstream system will be performed. Each manhole or grate inlet access to the system will be checked to verify the existence of the flow in question.

This systematic investigation will be conducted upstream to the point of identification of the source or to the point where the flow ceases between two manholes or grate inlets. In this case, in-system investigation may be necessary to determine the point at which the flow is entering the system, such as an illicit connection or crack in the system. Once the source has been identified, the procedures for Notification of Responsible Party, Abatement/Enforcement, and Documentation will then be implemented.

Wet-Weather Discharges

In the case of an illicit discharge or pollutant source that is indicated through wet-weather sampling, source identification will be performed as follows.

- ▶ A map of the drainage basin with aerial photography will be generated showing the mapped areas of the storm water system, 2-ft contour lines, city water and sewer lines, NPDES permitted facilities, and SIC codes of businesses.
- ▶ SIC code information will be studied to identify facilities that may not be required to have an NPDES permit or have filed for exemption from permitting but may have a potential for contributing pollutants to storm water runoff. EPA's *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems – A User's Guide*⁵ provides information on the pollutant potential of industrial and commercial categories of businesses.
- ▶ An initial assessment of the drainage area using this map will be conducted to identify potential sources of the pollutant(s). Once potential sources have been noted, these sources will be investigated through site visits to identify conditions or activities that could be the source of the pollutant(s).
- ▶ If a condition or activity is observed during this investigation that constitutes a pollutant source, the procedures for Notification of Responsible Party, Abatement/Enforcement, and Documentation will then be implemented.
- ▶ If no condition or activity is observed that appears to be the source of the pollutant(s), then additional wet-weather sampling will be conducted in an attempt to isolate the source of the pollutant. Locations for additional wet-weather sampling will be chosen depending on the situation. A sampling point may be chosen upstream from the point where a pipe or box discharges to the system in an attempt to eliminate that outfall. If an industrial facility or other location is suspected to be the source but cannot be verified as such through site visits, a point which drains only this location may be chosen for additional sampling to verify or eliminate this location as the source.
- ▶ If additional sampling results in isolation of the source, the procedures for Notification of Responsible Party, Abatement/Enforcement, and Documentation will then be implemented.

Notification of Responsible Party

If an illicit discharge is traced upstream to a known source or the party responsible for dumping is verified, the responsible party will be notified by site visit and/or written notification.

Abatement/Enforcement

Similar to source identification procedures, the actions taken to abate the illicit discharge depend on the nature of the discharge.

Spills or Illegal Dumping

In the case of a spill or dumping, if the responsible party is known, a request will be made to the responsible party to conduct cleanup of the spilled or dumped materials. The responsible party may conduct cleanup if appropriate materials and equipment are on-hand, or they may retain environmental services to conduct the cleanup. Cleanup typically involves containing the material if needed and utilizing absorbent materials and/or a vacuum truck to remove the material. Absorbent materials should be properly disposed of. Material removed by a vacuum truck

⁵ *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems – A User's Guide* (EPA/600/R-92/238), US Environmental Protection Agency, Office of Research and Development, Washington DC, January 1993.

should be hauled to the City's wastewater treatment plant or disposed of in an on-site sanitary sewer drain if prior approval to do so has been obtained from the City's Sanitary Services Division.

Discharges or Polluting Activities

If the illicit discharge is a dry-weather discharge or pollutant source indicated by wet-weather sampling results, a request will be made to the responsible party to discontinue the discharge or polluting activity. Depending on the cause of the discharge or the nature of the polluting activity, immediate compliance with this request may be appropriate, such as if the discharge is from washing activities. If the discharge is due to an infrastructure maintenance need on the property of the responsible party, then the request for abatement of the discharge will be formalized in writing with a time period, usually 30 days, given to comply with the abatement request. If the responsible party does not comply with this written request, official enforcement actions authorized in City Code Section 96-53 and listed below will be taken. Violators are subject to penalties as set forth in City Code Section 96-34.

- ▶ Notice of Violations
- ▶ Consent Orders
- ▶ Show Cause Hearings
- ▶ Compliance Orders
- ▶ Cease and Desist Orders
- ▶ Notice to Clean and Abate
- ▶ Mitigation
- ▶ Storm Water Pollution Prevention Plan
- ▶ Violations Deemed a Public Nuisance
- ▶ Costs of Enforcement

Unknown Responsible Party

If dumping or other discharges occur for which the responsible party cannot be determined, the Bridge & Waterways Section of Public Works will conduct cleanup when possible. The City's Emergency Spill Response Team will be contacted to assist when necessary in spill containment and neutralization. The Missouri Department of Natural Resources will be notified if the discharge is to waters of the state or is of a nature that requires the assistance of the MDNR Emergency Response Team.

Documentation

All illicit discharge investigations are documented in the City's Illicit Discharge database maintained by the Storm Water Services Division. If needed, an illicit discharge report is also drafted to contain additional details and is referenced in the database entry. Digital pictures are taken during illicit discharge investigations when possible and referenced in the database entry. The database entries for each permit year are reported in the annual report.

Activity: *7.b - Development and implementation of a Field Screening Program.*

The Field Screening Program at in-system locations and the Representative Monitoring Program at in-stream locations comprise a two-fold approach for monitoring the MS4. Table 3 illustrates the calendar schedule specified in the Permit for these two programs. The Representative Monitoring Program is discussed in Section 6.3 of this report. The Field Screening Program involves dry-weather and wet-weather screening.

- ▶ Dry-weather screening serves to identify illicit discharges to the MS4. If flows are present at screening locations during dry weather, field kits are used to test for chlorine, copper, phenol, and detergents. Further investigation is done to isolate the source of the discharge and, according to the field testing results, to isolate the source of the pollutant. Screening is required at a minimum of 50 locations each permit year.

- Wet-weather screening serves to quantify the quality of industrial discharges to the MS4. Screening points that drain industrial areas are sampled following rain events that meet criteria specified in the Permit. The samples are sent to the City's Wastewater Laboratory for analysis. Sampling at 25 points each year is required.

Table 3 – Calendar Schedule for Field Screening and Representative Monitoring Programs

Table 3. Calendar Schedule for Field Screening and 12-Parameter Monitoring Programs																																																																																																																																																						
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Sampling or Monitoring Event		Comments																																																																																																																																																				
Ambient sampling at 6 in-stream points		32 parameters – Second weeks in March, May, November																																																																																																																																																				
Wet weather sampling at 6 in-stream points		32 parameters – Once between March 1-May 31 Sampled no later than 48 hours after at least 0.2 inches and <3 inches during a 24-hour period preceded by at least 72 hours with no precipitation >0.1 inch																																																																																																																																																				
Dry weather screening at 50 points (5% residential)		If flow present, 4 parameters in field – Between June 1-October 1																																																																																																																																																				
Wet weather sampling at 25 industrial discharge screening points		18 parameters – Anytime throughout the year Sampled no later than 48 hours after at least 0.2 inches and <3 inches during a 24-hour period preceded by at least 72 hours with no precipitation >0.1 inch																																																																																																																																																				

Program Development

The method of establishing the required 250 field screening locations involved the utilization of MS4 inventory data along with sub-basin watershed configurations developed by the Storm Water Services Division. This is a practical and realistic methodology to approximate the density and distribution of screening locations that would be established using the grid cells methodology specified in Section II.A.7.b of the Permit. The sub-basin watersheds range in size from 0.01 square miles to 0.3 square miles, comparable to the specified size for grid cells. A GIS database has been created to contain the geographic and land use properties of each location and the results of screening.

Program Status

Dry-Weather Screening

The 250 screening locations have been established. Dry-weather screening was completed at 25 points in year one and 75 points in year two to achieve the program schedule for the first two years of the Permit. A list and maps of the 250 screening locations, showing the screening status of each location, are included in Appendix A. Of the 100 points screened, 6 had flow. Table 4 shows the field testing results for the discharges at these points. The results for the flows at sites 101 and 233 show only chlorine was present, indicating these flows were probably potable water. The results for the flows at sites 42, 60, 61 and 80 showed that all four parameters were present. The source of the flows at these six points could not be determined at the time of the field screening. These points will be screened again and if flow is observed, the source of the discharge will be investigated using the procedures outlined under Activity 7.a in this section of the report and required to be implemented in year three.

Table 4 – Dry-Weather Screening Results

Site #	Date	Chlorine (mg/l)	Copper (mg/l)	Detergents (mg/l)	Phenol (mg/l)	Temp (°F)	pH	DO (mg/l)	Conductivity (us)	Settleable Solids (mg/l)
42	8/25/03	0.2	0.1	0.2	0.1	N/A*	6.0	N/A*	N/A*	0
60	8/25/03	0.05	0.15	0.15	0.1	N/A*	7.5	N/A*	N/A*	0
61	9/8/03	0.2	0.05	0.1	0.1	76	7.4	10.67	721	N/A**
80	9/9/03	0.35	0.05	0.1	0.2	89	8.43	12.61	569	0
101	6/24/04	1.0	0	0	0	70	8.21	7.85	730	0
233	6/24/04	1.0	0	0	0	77	7.7	6.6	305	0

*Field meter unavailable due to being serviced.

**Imhoff cone not available. Water was clear in appearance with no visible settleable solids

Wet-Weather Screening

Wet-weather screening was completed at 28 points in year two. Samples were analyzed at the City's Wastewater Laboratory at the Southwest Wastewater Treatment Plant. Because wet-weather screening was implemented in year two, additional screening beyond the annual requirement of 25 points per year will be conducted in the remaining permit years to achieve the program schedule of 125 points over the life of the permit. Table 6 shows the wet-weather screening results.

Results Discussion

The wet-weather sample results were evaluated through comparison with the *10 CSR 20-7.031 Water Quality Standards* for Livestock & Wildlife Watering and Protection of Warm Water Aquatic Life and Human Health – Fish Consumption. Failure to meet these standards does not constitute a violation as these standards apply to the in-stream water quality of the classified streams that receive the runoff. Comparison with these standards is simply used as a means of evaluating the sampling results. The water quality standards are listed in Table 5.

Table 5 – Missouri Water Quality Standards (10 CSR 20-7.031)

Parameter	Water Quality Standard		
Oil & Grease (O&G) mg/l	10		
pH	6.5 – 9.0		
Dissolved Oxygen mg/l	≥5		
Chromium (CR) ug/l	42		
	Hardness <125	Hardness 125-200	Hardness >200
Copper (CU) ug/l	19	28	36
Lead (PB) ug/l	9	16	23
Nickel (NI) ug/l	360	500	650
Silver (AG) ug/l	3.5	7	11
Zinc (ZN) ug/l	241	340	433

Table 6 – Wet-Weather Field Screening Results

Site #	Date	pH	BOD	COD	TSS	TDS	N + N	TKN	DP	TP	O&G	Fecal	CaCO3	CR	CU	PB	NI	AG	ZN
42	8/28/03	7.12	6	82	<1	307	2.05	3.82	0.1	0.27	<1	23400	144	<10	5.5	<20	<10	<5	9.2
90	8/28/03	6.85	8	53	14	120	1.3	2.75	0.4	0.31	1.5	57000	41.7	<10	<5	<20	<10	<5	103
87	8/28/03	7.59	6	26	14	227	1.28	5.97	<0.01	0.29	<1	4500	121	<10	<5	<20	<10	<5	<5
88	8/28/03	7.01	16	83	90	164	0.665	3.48	<0.01	0.36	6	7000	57.1	<10	<5	<20	<10	<5	18.1
2	8/28/03	7.41	<1	7	<1	187	0.128	0.69	<0.01	0.55	<1	10	125	<10	9	<20	<10	<5	11.3
79	10/9/03	7.27	3	54	22	80	0.66	0.62	0.11	0.11	1.4	14600	44.4	<10	9.46	<20	<10	<5	46.9
66	10/9/03	7.13	4	55	14	67	6.18	0.82	0.12	0.11	3	36000	38.5	<10	7.13	<20	<10	<5	37.8
67	10/9/03	6.69	3	46	7	40	0.24	0.74	0.29	0.24	4.1	14200	25.3	<10	<5	<20	<10	<5	10.2
251	10/9/03	6.94	10	146	78	107	0.15	1.53	0.12	0.28	3.5	16000	96.3	<10	22	<20	<10	<5	186
61	10/9/03	6.9	6	61	135	200	0.47	1.2	4.4*	1.58	1.7	17500	108	<10	6.28	<20	<10	<5	53.2
49	10/9/03	8.54	4	40	44	133	0.16	0.82	0.04	0.06	1.3	9100	64.7	<10	<5	<20	<10	<5	13.8
84	11/14/03	7.09	4	41	11	13	3.25	2.15	0.06	0.07	<10	2400	17.3	<10	11.7	<20	<10	<5	52
85	11/14/03	6.6	34	72	14	13	0.59	1.69	0.01	0.39	5.5	925	17.7	<10	8.8	<20	<10	<5	135
86	11/14/03	7.98	5	69	195	27	2.77	2.81	0.16	0.25	<1	1390	21.5	10.7	9.68	<20	<10	<5	109
80	4/10/04	6.94	12	65	264	180	0.6	1.63	0.05	0.21	8.4	50	131	<10	5.24	<20	<10	<5	65.7
187	4/10/04	7.74	4	22	31	200	0.78	0.74	0.01	0.09	<1	650	192	<10	<5	<20	<10	<5	16.1
228	4/10/04	6.59	8	31	9	67	0.77	1.68	0.07	0.18	<1	3400	239	<10	<5	<20	<10	<5	60.2
148	4/10/04	6.86	7	13	15	293	1.94	0.15	0.04	1.08	<1	330	187	<10	<5	<20	<10	<5	41.2
219	4/10/04	6.64	16	37	27	107	1.14	2.45	0.16	0.28	<1	3700	153	<10	<5	<20	<10	<5	31.9
89	4/10/04	6.83	10	37	26	93	0.75	1.8	0.05	0.69	<1	550	48.5	<10	<5	<20	<10	<5	98.7
115	4/10/04	7.43	8	7	29	53	0.87	1.06	0.05	0.13	<1	30	37.8	<10	<5	<20	<10	<5	25
110	5/13/04	6.82	6	65	23	93	0.55	4.36	0.12	0.23	1.3	6600	42.6	<10	<5	<20	<10	<5	46.4
112	5/13/04	6.53	6	56	2	120	0.65	2.22	0.1	0.33	1.4	3600	38.5	<10	5.74	<20	<10	<5	66.2
113	5/13/04	7.04	3	33	21	133	1.38	1.67	0.05	0.26	<1	15000	64.3	<10	<5	<20	<10	<5	23.8
200	5/13/04	6.38	6	82	8	146	1.12	1.73	0.09	0.29	<1	16100	33.3	<10	5.08	<20	<10	<5	29.5
252	5/13/04	5.18	2	19	5	67	0.17	0.8	<0.01	<0.01	<1	<10	3.84	<10	<5	<20	<10	<5	14.8
107	5/13/04	6.75	3	32	11	107	0.28	1.64	0.02	0.21	<1	200	35	<10	<5	<20	<10	<5	13.6
106	5/13/04	5.85	39	469	72	3552	1.01	15.84	3.53	4.29	<1	15200	311	12.7	24.9	<20	<10	<5	73.6

Parameters are measured in mg/l, except metals are ug/l, and fecal coliform is colonies/100 ml. * The value for dissolved P for site #61 is suspect and appears to be contamination.
Parameter Abbreviations: BOD = Biochemical Oxygen Demand; COD = Chemical Oxygen Demand; TSS = Total Suspended Solids; TDS = Total Dissolved Solids; N+N = Nitrate + Nitrite;
TKN = Total Kjeldahl Nitrogen; DP = Dissolved Phosphorus; TP = Total Phosphorus; O&G = Oil & Grease; Fecal = Fecal Coliform; CaCO3 = Hardness; CR = Chromium; CU = Copper;
PB = Lead; NI = Nickel; AG = Silver; ZN = Zinc

Oil & Grease

All of the sampling results met the water quality standard for oil & grease.

Metals

All of the sampling results met the water quality standards for chromium, copper, nickel, and zinc. The sampling results for lead and silver were below detectable levels on all the samples. The detectable limits for lead and silver are within the water quality standard limits depending on the Hardness (CaCO₃) of the sample.

pH

Sites 252 and 106 had pH levels of 5.18 and 5.85 respectively, which are outside the range for pH in the water quality standards. The results of the other parameters at site 252 did not indicate pollutants. It is possible that the pH reading for this sample was inaccurate. Site 106 is the detention outlet for a large pickle processing facility. The low pH is indicative of the acidic nature of the pickling brine used at this facility. The City and MDNR have worked with this facility to address non-storm water discharges as well as their storm water runoff quality. Additional sampling will be conducted at this site and if necessary, the City will request that this facility take additional measures to address the quality of their storm water runoff.

BOD and COD

The levels for BOD and COD need to be low enough to ensure that the classified receiving water meets the water quality standard minimum for dissolved oxygen. Dissolved oxygen measurements were taken in the field at the time of sampling. Sites 42, 90 and 88 had DO levels below the water quality standard minimum of 5mg/l even though their BOD and COD levels were lower or roughly equivalent to other sites with higher DO levels. It is probable that the low DO levels at sites 42, 90, and 88 were due more to the stagnant nature of the water, since storm runoff flow had diminished at the time the samples were taken, than to the BOD and COD levels. Site 106 had a DO level of 8.97 mg/l but exhibited the highest levels of BOD and COD.

Fecal Coliform Bacteria

According to the Nationwide Urban Runoff Program study conducted by EPA in the early 1980's, "...fecal coliform counts in urban runoff are typically in the tens to hundreds of thousands per 100 milliliters of runoff."⁶ The sampling results for fecal coliform exhibit typical levels for storm water runoff.

The remaining sampling parameters for which there are no numerical water quality standards were evaluated through comparison with other general water quality information.

TSS

In order to provide a numerical reference for evaluation of the TSS results of the samples, the daily maximum limits for TSS in storm water general permits issued by MDNR for industrial facilities were looked at. The limits range from 60 to 120mg/l with the most common limit being 70mg/l. Another reference, the Minnesota Dept. of Environmental Quality, states, "Most people consider water with a TSS concentration less than 20 mg/l to be clear. Water with TSS levels between 40 and 80 mg/l tends to appear cloudy, while water with concentrations over 150 mg/l usually appears dirty."⁷

The majority of results for TSS were below 70mg/l. Based on observations of the sampling sites, the elevated levels of TSS at sites 61 and 88 are likely due in part to erosion in these natural channels. Site 251 is a roadside ditch receiving direct street runoff that is a probable source of TSS. Site 86 is at the end of a dead-end street where the runoff flows down the street into a detention area. During sampling it was observed that the runoff contained

⁶ As listed in an excerpt from the NURP report in the City of Springfield, Missouri Stormwater NPDES Permit Application Part 2, 1993

⁷ <http://www.deq.state.mi.us/documents/deq-sqw-npdes-TotalSuspendedSolids.pdf>

concrete fines or a similar type of particle. Site 80 is a pipe discharge to a concrete channel. Sources of the elevated levels of TSS at sites 86 and 80 will be investigated. Site 106 is the detention outlet that receives runoff from a pickle processing facility. Additional sampling is planned for this site due to high levels of several parameters.

TDS

There are no numerical water quality standards for TDS other than EPA's secondary standard for drinking water of 500mg/l (or ppm).⁸ All of the results for TDS except for site 106 were well below 500mg/l. As previously mentioned, additional sampling is planned for site 106 due to high levels of several parameters.

Phosphorus and Nitrogen

The levels of nitrogen and phosphorus were compared to NURP event mean concentrations³ listed below:

- ▶ Nitrate + Nitrite = 0.86mg/l
- ▶ TKN = 2.3mg/l
- ▶ Dissolved phosphorus = 0.15mg/l
- ▶ Total phosphorus = 0.5mg/l

Some of the results exceed these levels. There are many possible sources of nitrogen and phosphorus in storm water runoff including lawn fertilizers, erosion, animal waste, and industrial sources. As the focus of this sampling is on industrial discharges, industrial sources of nitrogen and phosphorus will be investigated by looking at SIC codes and facilities in the drainage area that have storm water discharge permits.

In conclusion, site 106 exhibited elevated levels for nearly all parameters and is the highest priority for additional testing and investigation. Sites 80 and 86 exhibited the highest levels of TSS and should undergo investigation.

Activity: 7.c. (1) *The permittee shall develop and implement standard procedures to investigate portions of the MS4 when illicit discharges are discovered or reported.*

The standard procedures for investigation of the MS4 when illicit discharges are discovered or reported are detailed under 7.a. Source Identification.

Activity: 7.c. (2) *The permittee shall develop and follow legally sound procedures in pursuing investigations on non-stormwater discharges, such as guidelines for entry, investigations of private property, notification protocols, and documentation.*

City Code Sections 96-31 through 96-36 provide legal authority and procedures for entry and investigations of private property, notification protocols, and documentation.

⁸ <http://bcn.boulder.co.us/basin/data/NUTRIENTS/bc/TDS.html>

Activity: 7.d - Continue operation of the Emergency Spill Response Team.

The Fire Department's Emergency Spill Response Team responds to spills in accordance with the *Hazardous Materials & Chemical Emergency Response Plan* adopted by the City of Springfield in October of 1987. A copy of the plan is on file with the City Clerk.

During year two, the Emergency Spill Response Team (ESRT) was dispatched to one spill to the storm water system to assist in spill containment and neutralization. Other spills and citizen reports of polluting activities did not require the assistance of the ESRT. Storm Water Services personnel responded to a total of 4 spills, including the one to which the ESRT was dispatched, and 21 citizen reports of polluting activities during year two. These incidents are listed in Table 7. The number of incidents indicates an increase in citizen reporting in comparison to year one during which Storm Water Services personnel responded to a total of 5 spills and 6 citizen reports of polluting activities. As summarized under Activity 7.e, Storm Water Services has worked to develop a public education program on illicit discharge reporting.



Figure 13 - Emergency Spill Response Team assisting in spill containment and neutralization



Figure 14 – Illicit discharge from power washing a building

Storm Water Services has used informational mailings in response to citizen reports of polluting activities. Depending on the nature of the report, these mailings are often sent to a broader group than the alleged responsible party. In the case of a report of a polluting activity at or near a residence, the mailing may be sent to the surrounding neighborhood if the source of the pollutant cannot be verified or if the polluting activity is suspected to be a common practice in the area. A mailing regarding a business activity that constitutes an illicit discharge to the MS4 may be sent out industry-wide if the activity may be a common industry practice. One informational mailing was distributed during year two. Guidelines concerning the discharge of wash waters were mailed to approximately 450 businesses in the automotive dealer, repair, and cleaning industries. This letter is included in Appendix D. Subsequent discussions with the MDNR Southwest Regional Office following this mailing resulted in some modifications to the information provided in the letter.

Table 7 – Illicit Discharge Incidents

Date	Location	Description	Investigation Result
8/13/03	1600 block W Lindbergh	Discharge of swimming pool water onto neighboring property	Sent letter stating that water needs to be dechlorinated and cannot discharge onto neighboring property
8/15/03	1008 E Kearney St	Discharge of wash waters onto neighboring business	Site visit and industry-wide mailing about no discharge of wash waters
9/8/03	2169 E Blaine St	Discharge of transmission fluid and motor oil from drainpipe into ditch	Entity excavated and replaced contaminated soil; Informed entity that discharges from work bay to storm drain are prohibited
9/15/03	901 S National Ave	Spill of hydraulic fluid to storm drain	Oil-absorbent booms placed in downstream manhole and at on-site storm drain; storm system flushed
10/1/03	2836 W Division St	Neighborhood complaint about standing water from truck washing	Water was runoff from spillage during filling of water tanks on trucks; Rerouted drainage to ditch. MDNR later issued NOV.
11/4/03	2726 W Division St	Molasses spill	Spill was contained in retention pond and hauled by septic service
11/14/03	3938 S Lone Pine Ave	Discharge of wash waters to street and deposits of concrete sediments on adjacent trail	Site visit informing entity about no discharge of wash waters; entity removed deposits from trail
12/29/03	SE corner Portland/Campbell	Oil leaking onto street from vehicle	Street Maintenance Division cleaned up oil
12/30/03	James River at Old Hwy 65	Abandoned vehicle in river	Police Dept removed vehicle
2/3/04	701 E Chestnut St	Molasses spill	Majority of spill contained and hauled; MDNR authorized ESRT to do a flush to dilute remaining spill to creek.
2/17/04	1660 E Chestnut Expy	Fish kill in channel	Pursued investigation of suspected pollutant source upstream
2/18/04	501 N Main Ave	Discharge of wash water to storm drain	Informed entity that wash waters must go to existing sanitary sewer drain in loading dock area
3/10/04	1100 N Glenstone Ave	Discharge of process water containing dye to storm system	Entity began investigation to locate source of dye water into the system
4/1/04	3331 E Sunshine St	Pumping of water containing sediment and traces of petroleum from excavated areas to street	Pumping halted and standing water removed from street; remaining water hauled to treatment plant
4/13/04	2848 N LeCompte Rd	Spill of approx. 200 gallons of brine to drainageway	Drainageway pumped and hauled to treatment plant
4/19/04	1100 N Glenstone Ave	Colored water in channel	Met w/ upstream entity to request timeline for fixing sanitary sewer leak
4/29/04	2126 E Dale St	Sanitary sewer line break surfacing near drainage channel	Surfacing area pumped and neutralized w/ lime; no discharge observed in channel
5/4/04	501 N Main Ave	Discharge of wash waters to storm drain	Informed entity that wash waters must go to existing sanitary sewer drain in loading dock area
5/7/04	1500 block S St Mary's Ave	Motor oil discharging to street	No evidence of motor oil observed
5/18/04	2615 E Kearney St	Discharge of wash waters and/or chemicals killing neighboring lawn	Grass kill determined to be from herbicide used to manage weeds along property line
5/24/04	1133 E Kearney St	Discharge of process water to storm system	Downstream channel pumped; discharged determined to be due to sump pump not operating
6/3/04	3505 E Nora St	Wash water discharging onto adjacent property and killing vegetation	Site visit was made and entity claimed all washing is done in indoor wash bay
6/6/04	2035 E Bennett St	Discharge of process water to storm system	No discharge observed in downstream channel; sewer blockage causing discharge was corrected
6/17/04	Chestnut St/Brown Ave	Dry-weather flow in channel causing increase in mosquitoes	Source of flow determined to be water main leak which was repaired
6/17/04	2301 E Manchester St	Discharge of wash waters containing paint to ditch	Informed entity of no discharge of wash waters; Entity cleaned up paint solids

Activity: 7.e – Develop and implement a program that informs the public on how to report spills, illegal dumping, illicit connections and water quality problems. The program shall provide the public information as to what to look for and how to report incidents.

The City has utilized a variety of methods to inform the public on reporting illicit discharges and water quality problems. As reported under Activity 7.d, public reporting of illicit discharges increased from 6 reports in the first permit year to 21 reports in the second permit year.

The *Quality Ozark Streams* flyer included in City Utilities bills distributed to approximately 98,000 customers in October 2002 and 2003 provided phone and Internet contacts for the public to report illegal dumping. This flyer was also included in the Fall/Winter 2003 issue of *The Front Porch* newsletter distributed by the City's Neighborhood Conservation Office. The flyer continued to be distributed throughout the year at educational events summarized in the Calendar of Activities in Section 5.10 of this report. Other opportunities to inform the public on reporting polluting activities are utilized whenever possible. Contact information for reporting was included in an article submitted by Storm Water Services and published in the Ozarks Voices section of the *Springfield News-Leader* editorial page on January 23, 2004. In year two, this public education message on reporting illegal discharges was expanded by including information on What to Watch For. The following information was included in the ***Choose Environmental Excellence*** Spring 2004 newsletter (See Appendix C) and is featured on the homepage of the Storm Water Services Division website.

Pollution Reporting

To report spills, dumping or discharges of pollutants to the storm water system or streams, or other water quality problems, call Springfield's Storm Water Services Division at 864-1901 or submit a Citizen Service Request at www.springfieldmogov.org/webapps/serv_req/. For spill emergencies after normal business hours, please contact the Springfield Fire Department.

What to watch for:

- ▶ Dumping of motor oil or other chemicals in streets, ditches or storm drains
- ▶ Discharges of commercially generated wash waters (e.g. from washing of trucks, equipment, parking lots, structures, or from services such as carpet cleaning) to the street and/or storm drains
- ▶ Improper outdoor storage of chemicals and other materials that can pollute storm water runoff
- ▶ Disposal of grass clippings, leaves, or other yardwaste in streets and ditches
- ▶ Sediment discharging from construction sites, or other erosion problems

Activity: 7.f - Continue program that informs the public on proper management and disposal of used oil and toxic materials.

The Solid Waste Management and Storm Water Services Divisions of Public Works provide public education on the proper management and disposal of used oil and toxic materials.

◆ The City's Household Chemical Collection Center is available to Greene County residents for proper disposal of unneeded household chemicals, including used oil and toxic materials. The HCCC was highlighted on the *Quality Ozark Streams* flyer included in City Utilities bills distributed to approximately 98,000 customers in October 2002 and 2003. This flyer is included in Appendix C. The Solid Waste Management Division has produced and distributed a brochure that provides information about visiting the HCCC and guidelines on proper storage and handling of household chemicals. This information is also available on the Division's web page at www.springfieldmogov.org/recycling/housechem.html. A nine-year comparison of the amount of

materials collected at the HCCC from its opening in 1994 through the first permit year ending in June 2003 is included in Appendix B. In year two of the permit, 93,364 lbs. of materials were collected at the HCCC. Of this total, 83% was recycled. A breakdown of the materials recycled as shown on the nine-year comparison was not available for year two of the permit (tenth year of operation for the HCCC) at the time of this report. As reported in the 2004 *Environmental Report Card* for Springfield-Greene County, the amount of material collected and the percent recycled at the HCCC is on an upward trend based on a 5-year mean⁹. As listed in Section 5.10 of this report, several tours of the HCCC were given for area school groups. Presentations, displays, and information about the HCCC were provided at a number of community meetings and events.

- ◆ The Solid Waste Management Division has also produced a *Guide to Recycling in Springfield* that includes a list of local retailers that accept used oil. This guide is distributed as a brochure and is also available on the Division's web page at www.springfieldmogov.org/recycling/guiderec. In year two, the guide was included in the Dickerson Park Zoo newsletter, *WildTimes*, which is distributed to approximately 4,000 subscribers.
- ◆ The City also cosponsors neighborhood cleanup and waste collection events. Two electronic waste collection events were held during year two, resulting in over 18 tons of e-waste being collected. Over 95% of this waste will be recycled at the Computer Recycling Center in Springfield. A "Toss Your Tires" waste tire collection event was also held, resulting in over 12,000 tires (twelve tractor-trailer loads) being collected.

Activity: 7.g - Implement program to reduce or eliminate to the extent practicable the inflow, infiltration and discharge of sanitary sewage into the MS4.

A primary objective of the City's Infiltration and Inflow (I/I) Program is to reduce to the maximum extent practicable the occurrence of sanitary sewer overflows (SSOs) into the MS4. A Sewer System Evaluation Survey (SSES) was completed system-wide in June 2003. The SSES was conducted to identify possible sources of I/I. The correlation of measurements from rainfall and flow monitoring using flow meters placed at varying locations throughout the sanitary sewer system was studied to indicate the extent of I/I. Several methods were then used to identify the specific sources of I/I. These methods include visual inspection to locate faults in manhole covers and accessible pipes, TV inspection to assess internal pipe conditions, and dye and smoke testing to locate and confirm faulty sewer pipes that may not be readily visible.

Once specific sources of I/I are identified, rehabilitation is performed using manhole wall spraying, in-place pipe relining, and manhole frame and lid replacement. Currently, 3 regular full-time and 5-8 contract personnel conduct rehabilitation of the system. Since 1996, 60,908 lineal feet of sanitary sewer lines and over 11,855 manholes have been rehabilitated, resulting in over 81.15 million gallons per day reduction of wet-weather flows. Wet-weather SSOs have significantly decreased in both frequency and duration. Treatment plant flows during wet-weather conditions have experienced similar decreases in both frequency and duration of peak flow events. Ten percent of sanitary sewer revenues are earmarked to finance ongoing I/I programs. Since 1995, the City has committed approximately \$15 million to fund the I/I program.

Following the completion of the SSES, it has been determined that the wastewater utility should continue the I/I Program as an ongoing effort to look for opportunities



Figure 15 – Rehabilitation of a sanitary sewer manhole

⁹ <http://www.springfieldmogov.org/health>

to efficiently and economically reduce SSOs and I/I impacts on the wastewater infrastructure. Virtually all I/I and SSO reduction has been accomplished on the public side of the wastewater infrastructure. Studies by the wastewater utility have shown that at least 50% of the source and intrusion of wet-weather flows into the sanitary sewer system are derived from private sources, i.e. broken or leaky building sewers, leaky basements, and illegal connections of footing drains, roof drains, sump pumps, area drains, etc. Because these sources are on private property they cannot be corrected unilaterally by the wastewater utility. A funding mechanism and public acceptance of a private I/I reduction program is needed to effectively address the SSO problem. The I/I and SSO problems are often related to inadequate storm water systems and could be addressed in a cooperative manner in many cases. Information about the City's Infiltration and Inflow Program is available on the City's website at www.springfieldmogov.org/sanitary/infiltration.html.

5.8 – Monitor and Control Pollutants from Industrial and High Risk Runoff

Activity: 8.a – *The city will develop a program to identify the following industries that discharge to the MS4:*

1. *Municipal landfills*
2. *Hazardous waste treatment, storage and disposal facilities*
3. *Industries subject to reporting requirements pursuant to SARA Title III Section 313; and*
4. *Industrial facilities that the city determines are contributing a substantial loading of pollutants to the MS4.*

The City has identified the industry categories listed above.

1. There are no active municipal landfills within the City limits. Prior landfill sites are listed in Section 5.5 of this report.
2. Information on hazardous waste treatment, storage and disposal (TSD) facilities was obtained from the Missouri Department of Natural Resources.¹⁰ The TSD facilities located in Springfield are listed below.

- ▶ Clariant LSM Inc. – 2460 W. Bennett St.
- ▶ Kerr-McGee – 2800 W. High St.
- ▶ Safety-Kleen – 734 N. West Bypass
- ▶ VOPAK USA Inc. – 505 E Trafficway
- ▶ Zenith Electronics Corp. (Tracker Marine) – 2500 E. Kearney St.

3. Information on SARA Title III Section 313 reporting was obtained from the Missouri Department of Natural Resources.¹¹ This data is referred to as the Toxics Release Inventory. The most current data available is for 2002. A list of the reporting facilities is included in Appendix B.
4. Facilities determined by the City as contributing a substantial loading of pollutants to the MS4 will be identified through the field screening program or public reporting information. As summarized under Activity 7.b in Section 5.7 of this report, the facility at site 106 has been identified as a priority for additional monitoring.

¹⁰ <http://www.dnr.state.mo.us/alpd/hwp/permits/permits-facilities.htm>

¹¹ Gene Nichols, Environmental Assistance Office, Missouri Department of Natural Resources, Jefferson City, MO.

5.9 – Construction Site Runoff

Activity: *9.a - Continue current erosion and sediment control regulations for land disturbance activities for areas less than five acres.*

Section 96-21 of the City Code states:

“No person shall cause or allow sediment to be deposited in any public street, public land, or on any property not under their control as a result of land disturbance of less than five acres resulting from construction activities.”

The City Code requires that all persons engaged in land development or land disturbance activities within the City limits must adhere to the *Erosion and Sediment Control Guidelines* issued by the Director of Building Development Services and on file with the City Clerk. These guidelines are organized to meet the following objectives:

- ▶ Minimize the area disturbed by construction and development
- ▶ Provide for containment of sediment until areas are stabilized
- ▶ Stabilize disturbed areas as soon as practical after project completion
- ▶ Provide permanent erosion, drainage, and detention controls

All site development plans are reviewed by both Building Development Services and Storm Water Services. All plans receive a stamp indicating that erosion and sediment control measures must be followed. Site inspections are conducted by Building Development Services. Development plans for subdivisions, which are reviewed by Storm Water Services, must also include measures for erosion and sediment control. Public Works conducts site inspections of subdivisions.

Public Works maintains a MOR100 land disturbance permit issued by MDNR for all Public Works construction projects with land disturbance of 1 acre or more as required. The City submits a quarterly activity report to MDNR detailing the status of land disturbance sites.

Activity: *9.b - Continue to require land disturbance permits from the MDNR for sites of five or more acres.*

During the first permit year, in compliance with new MDNR regulations, the City expanded the requirement for a land disturbance permit from MDNR to include sites of one or more acres. Additionally, a new procedure has been implemented requiring developers to show that they have obtained the necessary permit from MDNR before the City will issue a building permit.

Activity: *9.c - Provide information for education of construction site operators.*

New designers or those unfamiliar with the City’s policies are provided an informational packet that includes a copy of the *Erosion and Sediment Control Guidelines*. These guidelines are also available for downloading on the City’s website at www.springfieldmogov.org/stormwater/stormwater_docs. Review and inspection staff members work to educate site designers and construction site operators when possible.

The City is working to adopt a more proactive approach to erosion control at construction sites. To initiate discussions on a more proactive approach, a meeting of City personnel from several divisions of Public Works was held in April 2004 in conjunction with an APWA webcast on the subject. Also in April, City personnel gave presentations on erosion & sediment control at a seminar for developers and regulators hosted by area companies. A workshop for construction site operators is planned for the third permit year.

5.10 - Comprehensive Education and Public Outreach Program

Storm water education and public outreach activities include displays and presentations at community events, media and publications opportunities, and presentations and workshops for area audiences. Storm water/water quality issues are the primary focus of many education and public outreach activities while also being included as a closely related topic in the educational activities of the Solid Waste Management Division. This combined educational focus highlights the dual benefits for solid waste management and storm water quality of such programs as the Household Chemical Collection Center (HCCC) and the Yardwaste Recycling Center (YRC). Storm water education activities during year two are described below. The City also provides funding support to the Watershed Committee of the Ozarks and James River Basin Partnership. These local organizations provide education and public involvement opportunities on water quality issues.

- ◆ Storm Water Services completed a major revision of the Division's website in December 2003. This revision expanded the site from 3 pages to 21 pages, providing information about the City's NPDES permit activities, pollution prevention and water quality, programs and services provided by the division, and other storm water topics. Since the release of the revised website, the Division has increased efforts to advertise the website on publications and at outreach opportunities to fully utilize its potential as a public education tool. The new website was highlighted in the *Choose Environmental Excellence* Spring 2004 newsletter included in Appendix C. Figure 16 illustrates the significant increase in visits to the website following the revision. The website is continually updated to provide information on current projects and activities. The website address is www.springfieldmogov.org/stormwater.

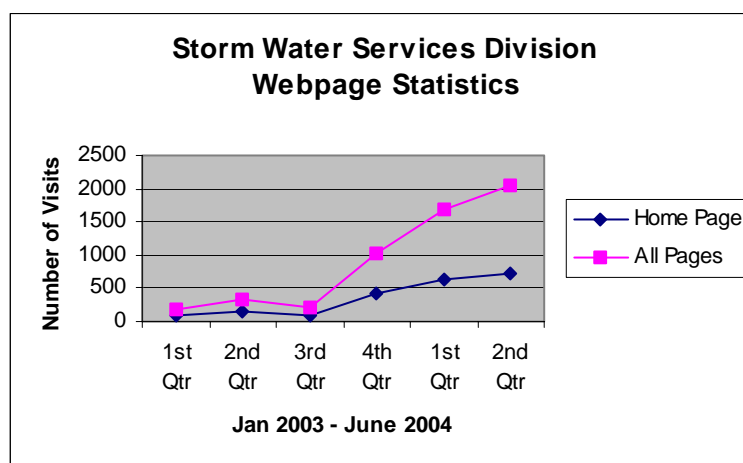


Figure 16

- ◆ An educational flyer titled *Quality Ozark Streams* was included in City Utilities bills distributed to approximately 98,000 customers in both October 2002 and 2003. The flyer includes information on the City's NPDES Permit, along with examples of how the public can help prevent storm water pollution. These examples include the proper disposal of yardwaste and household chemicals, as well as guidelines for responsible yard maintenance and reporting illicit discharges. This flyer is included in Appendix C.
- ◆ Storm Water Services staff authored an article about storm water BMPs on a downtown redevelopment project. The article, titled *Local Developer Contributes to Good Water Quality*, provided information about regulations on non-storm water discharges to the MS4, encouraged public inquiries about BMPs, and recognized the efforts of the developer. The article as it was published in the *Choose Environmental Excellence* Spring 2004 newsletter is included in Appendix C. The article was also published in the *Springfield News-Leader* Ozark Voices section, the *Missouri Municipal Review*, and the *APWA Reporter*.

◆ To raise community awareness that discharges to the storm water system flow into area streams, rivers, and lakes, the City installed 200 storm drain markers stating “No Dumping Drains To Waterways”. These markers were placed on curb inlets in areas that receive a significant amount of pedestrian use in midtown and downtown near redevelopments including the minor league baseball stadium and the Springfield Exposition Center. The City supports the efforts of local volunteer groups who participate in stenciling storm drains. Storm Water Services will provide maps showing the locations of storm drains to facilitate this activity.



Figure 17 – Storm drain marker

◆ In celebration of Earth Day on April 19, 2003, Public Works personnel and volunteers collected trash and other items including tires and couches in and along Jordan Creek from Main Avenue to west of the Grant Avenue viaduct.

◆ An exhibit titled Our Watershed is available for interactive learning at the Discovery Center of Springfield. The exhibit contains a variety of information on storm water runoff, septic tanks, karst topography, and land uses as related to watershed issues. The exhibit, which was coordinated by the Watershed Committee of the Ozarks, received grant funding from the Missouri Department of Natural Resources with additional funding from the Solid Waste Management and Sanitary Services Divisions of Public Works, and Silver Dollar City. The exhibit is utilized in water education events.

◆ The City’s water quality related divisions and services are featured in two local guides – the ***Choose Environmental Excellence*** *Springfield Area Directory of Environmental Agencies and Organizations* and the Interpreters Coalition of Greene County *Community Resource Guide*. The CEE directory, which includes listings for the Storm Water Services and Solid Waste Management Divisions and the Industrial Pretreatment Program, provides contact info and descriptions of services provided by local agencies and organizations involved in environmental issues. The Community Resource Guide, which includes listings for the HCCC, Yardwaste Recycling Center, and Southwest Wastewater Treatment Plant, provides information about community resources available for field education and hands-on learning.

◆ The Environmental Report Card is an effort to monitor environmental indicators over time in Greene County and provide a report of these indicators to the public. These indicators include measurements of water quality and quantity, community health, solid waste/recycling, air quality, and population. Water quality and quantity were the focus of the *2004 Environmental Report Card*, which covers the same time period as year two of the permit. The report provides a brief summary of water quality efforts including the City's SWMP as well as storm water BMPs that individuals and businesses can put to use. The report, available at www.springfieldmogov.org/health, is a collaborative effort of the Environmental Collaborative of the Community Partnership of the Ozarks, Springfield-Greene County Environmental Advisory Board, Springfield-Greene County Health Department, Springfield-Greene County Park Board, City of Springfield Public Works, Ozark Greenways, and the Watershed Committee of the Ozarks.

Calendar of Activities

August 2003

- ▶ Free Wheelin' Friday – Tour of field trip locations for Springfield Public School teachers, including City's Household Chemical Collection Center
- ▶ Genesis Day – Provided educational materials for Springfield Public Schools workshop, including information on the Household Chemical Collection Center

October 2003

- ▶ *Quality Ozark Streams* flyer in City Utilities customer bills (See Appendix C)
- ▶ Let's Make a Splash water education festival at the Discovery Center of Springfield for local 5th grade classes
- ▶ Vision 20/20 sponsored presentation by Jon Jones, Wright Water Engineers, about storm water issues in Springfield
- ▶ Storm water design manual luncheon for development team and technical and citizen review teams
- ▶ SMY&N presentation to Brentwood Estates Garden Club
- ▶ Mailing to SMY&N Professionals providing information about the Household Chemical Collection Center, proper disposal of yardwaste, training opportunities, and a copy of the *Quality Ozark Streams* flyer (See Appendix C)

November 2003

- ▶ NPDES storm water permit presentation to the Springfield Chamber of Commerce Environmental Issues Business Forum (See Appendix C)
- ▶ KSMU radio interview about NPDES storm water permit activities
- ▶ America Recycles Day activities cosponsored by the City:
 - City wide electronic waste collection event. Over 95% of the 13.5 tons of e-waste collected will be recycled by the Computer Recycling Center in Springfield.
 - Toss Your Tires collection event (See Appendix C). Over 12,000 tires (12 tractor trailer loads) were collected.
- ▶ *Quality Ozark Streams* flyer text and information on proper disposal of yardwaste in Fall/Winter 2003 issue of *The Front Porch* (See Appendix C)

December 2003

- ▶ Release of new Storm Water Services Division website
- ▶ *Springfield News-Leader* article about City's website including new Storm Water Services Division webpage
- ▶ TRIM II Urban Forestry & Storm Water Management seminar hosted by Ozark Greenways (See Appendix C)
- ▶ SMY&N presentation and display at the Soil and Water Conservation Service Regional Conference
- ▶ SMY&N presentation to the Ozark Water Garden Society
- ▶ Publication of two new SMY&N booklets – *Take Home Tips* and *Cool-Season Grasses Lawn Care and Maintenance Calendar* (See Appendix C)

January 2004

- ▶ SMY&N presentation at MU Extension Pesticide Applicator Certification class
- ▶ Presentations to Leadership Springfield class on environmental topics including storm water and solid waste management
- ▶ Attendance at facilitators training for Projects Wet, Wild and Learning Tree sponsored by the Missouri Department of Conservation
- ▶ SMY&N presentation to City Utilities grounds maintenance staff

- ▶ Developer Works to Protect Water by Storm Water Services Division published in *Springfield News-Leader* Ozark Voices section and circulated via Watershed News email service provided by Upper White River Basin Foundation
- ▶ Publication of revised *Guide to Recycling in Springfield* including locations to recycle used motor oil and antifreeze

February 2004

- ▶ SMY&N and Solid Waste Management Division displays at the Springfield Home Show at the Jordan Valley Park Exposition Center
- ▶ SMY&N display, Simple Steps to Practical Lawn Care seminar and Solid Waste Management Division display at the Lawn & Garden Show at the Ozark Empire Fairgrounds
- ▶ Participation in round-table discussion about water quality issues with Senator Jim Talent
- ▶ Classroom presentation about the Household Chemical Collection Center and tour of the Center with Springfield Public School students as part of Students Go To Work sponsored by the Springfield Chamber of Commerce

March 2004

- ▶ Watershed and Water Quality Planning seminar cosponsored by the City (See Appendix C)
- ▶ Luncheon/workshop sponsored by the Watershed Committee of the Ozarks on Low Impact Development principles for storm water management
- ▶ SMY&N display at the Greater Ozarks Flower & Garden Show
- ▶ SMY&N presentation to the Organic Growers Association
- ▶ SMY&N display at the Naturescaping Symposium at the Springfield Conservation Nature Center
- ▶ Presentation to the Brentwood Estates Garden Club about the Household Chemical Collection Center and other Solid Waste Management Division services
- ▶ Presentation to the Northview Senior Center about the Household Chemical Collection Center and other Solid Waste Management Division services
- ▶ Revision of the Solid Waste Management Division curriculum guide *It is Easy Being Green* to include state education standards; Unit 4 of the guide covers Household Chemical Waste topics
- ▶ SMY&N presentation to the MU Extension MO Garden class
- ▶ Release of revised SMY&N webpage

April 2004

- ▶ Publication of Local Developer Contributes to Good Water Quality article and information about the Storm Water Services Division website, annual report, and illicit discharge reporting in the ***Choose Environmental Excellence*** Spring 2004 Newsletter (See Appendix C)
- ▶ Storm Water Services Division and Solid Waste Management Division displays at Fantastic Friday at the Discovery Center of Springfield
- ▶ Erosion and sediment control presentation at Storm Water Management Course sponsored by E&S control products companies
- ▶ Earth Day activities cosponsored by the City, including:
 - Electronic waste collection at the Lone Pine Recycling Center. Approximately 9,400 pounds was collected for recycling at the Computer Recycling Center in Springfield)
 - Jordan Creek cleanup
 - Neighborhood cleanup in 6 neighborhoods; HCCC open extended hours (See Appendix C)
 - Celebration at the Discovery Center of Springfield including a SMY&N workshop and Solid Waste Management Division display
- ▶ Earth Day activities were featured in an article in the *Springfield News-Leader* on April 22.
- ▶ NPDES storm water permit presentation at the James River TMDL Phase II public meeting
- ▶ Tour of Household Chemical Collection Center for Drury University Global Futures class

- ▶ Presentation about Solid Waste Management Division services including the Household Chemical Collection Center at the Brentwood Library
- ▶ Presentation about Solid Waste Management Division services including the Household Chemical Collection Center for Southwest Missouri State University Earth Science for Teachers class

May 2004

- ▶ Tour of the Household Chemical Collection Center for Marshfield High School students
- ▶ SMY&N presentation to Northview Senior Center
- ▶ KY3 TV interview about proper yardwaste disposal
- ▶ Tour of Household Chemical Collection Center for Boy Scout troop
- ▶ Solid Waste Management Division display including the Household Chemical Collection Center for Public Works Week at the Discovery Center of Springfield
- ▶ ICMA webcast Seeing Green with Trees: The Economic and Environmental Benefits of Urban Forests at the Springfield Conservation Nature Center (See Appendix C)

June 2004

- ▶ Publication of Local Developer Contributes to Good Water Quality article in *Missouri Municipal Review*
- ▶ *Springfield News-Leader* article about City/Army Corps of Engineers Jordan Creek Feasibility Study
- ▶ *Springfield News-Leader* article about Vision 20/20 5-year Plan, including the recommendations for addressing storm water issues
- ▶ SMY&N display at River Rescue
- ▶ SMY&N certified yards were included in the Greater Ozarks Water Garden Society Tour. Brochures and handouts were provided.

6.0 Monitoring Section

6.1 - Inventory of Known Major Outfalls

Major outfalls were identified based on the following definitions from 10 CSR 20-6:

- ▶ “Outfall. A point source as defined by 10 CSR 20-2.010 at the point where a municipal separate storm sewer discharges and does not include open conveyances connecting two (2) municipal separate storm sewers, pipes, tunnels or other conveyances which connect segments of waters of the state and are used to convey waters of the state.”
- ▶ “Major municipal separate storm sewer system outfall (major outfall). A municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of thirty-six inches (36”) or more (or its equivalent) or for municipal separate storm sewers that receive storm waters from lands zoned for industrial activity within the municipal separate storm sewer system with an outfall that discharges from a single pipe with an inside diameter of twelve inches (12”) or more (or from its equivalent). Industrial activity areas do not include commercial areas.”

The equivalent of a single pipe with an inside diameter of thirty-six inches or more is further defined in 40 CFR Part 122.26 as “...discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres”. The equivalent of a single pipe with an inside diameter of twelve inches or more is further defined as “...discharge from other than a circular pipe associated with a drainage area of 2 acres or more”.

According to these definitions, the following types of discharge points were identified as major outfalls:

- ▶ A single pipe with an inside diameter of 36 inches or more (or a single conveyance that drains an area of more than 50 acres) that discharges at the municipal boundary or discharges into waters of the state.
- ▶ In areas zoned for industrial activity, a single pipe with an inside diameter of 12 inches or more (or a single conveyance that drains an area of 2 acres or more) that discharges at the municipal boundary or discharges into waters of the state.

The known major outfalls identified in year two are listed in Appendix B. Additional major outfalls will be identified as mapping of the MS4 progresses.

6.2 - Estimate of Total Annual Volume of Urban Runoff Discharges

The total annual volume of urban runoff discharges for the City is estimated to be 11.7 billion gallons as shown in Table 8. The calculation is based on a total precipitation during year two of 44.5 inches according to the National Weather Service station at the Springfield-Branson Regional Airport. To calculate this estimate, the individual precipitation events that occurred throughout the year were categorized by precipitation amount as shown in Table 8. The runoff volumes for categories 5 and 6 were calculated using the Runoff Curve Number method (Soil Conservation Service, 1986¹²). This method uses the following equation:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

where

Q = runoff (inches)

P = rainfall (inches)

S = potential maximum retention after runoff begins (inches)

I_a = initial abstraction (inches)

and

$$I_a = 0.2S$$

$$S = \frac{1000}{CN} - 10$$

where

CN = curve number ranging from 0-100 that is determined by knowing the hydrologic soil group and land cover type

The CN is a weighted average of the CN for the impervious and pervious cover types according to the percentage of these types in the City limits. The percentage of impervious cover and the type and percentage of pervious cover were estimated through examination of aerial photographs of the City. The total discharge volume is determined by multiplying Q by the total area within the City limits. The following numbers were used in calculating the runoff volume for categories 5 and 6:

- ▶ % Impervious = 35
- ▶ Impervious CN = 98
- ▶ % Pervious Cover = 65

¹² Soil Conservation Service, 1986 "Urban Hydrology for Small Watersheds", Technical release 55, Washington, DC: U.S. Department of Agriculture

- ▶ Pervious CN = 73
- ▶ City area = 50,696 acres

Using the SCS Curve Number method, the precipitation amount for categories 1-3 is not great enough to overcome the calculated infiltration loss, resulting in a runoff volume of zero. However, experience dictates that these rainfall events do in fact create a substantial amount of runoff, which is largely due to the amount of directly connected impervious area within the watershed. Therefore, a more accurate estimate for these categories can be obtained by assuming that directly connected impervious area is the sole source of runoff from precipitation events in these categories. The area within the City limits is estimated to be 35% impervious. It is estimated that half of the impervious area, equaling 8,871 acres, is directly connected. The runoff volume for these categories is estimated by multiplying the precipitation amount by 8,871 acres. For category 4, the calculation of runoff using the SCS Curve Number method results in a volume less than the calculated volume for category 3. Therefore, the runoff volume for category 4 was calculated with the same method used for categories 1-3.

Table 8 – Total Annual Volume of Urban Runoff Discharges

Precipitation Category (inches)		Average Precipitation	# of Events Per Category	Runoff "Q" (inches)	Runoff Volume Per Event		Total Runoff Volume	
					Cubic Feet	Gallons	Cubic Feet	Gallons
#1	0 – 0.1	0.02	71	0.02	644,037	4,806,247	45,726,635	341,243,545
#2	0.11 – 0.2	0.16	18	0.16	5,152,297	38,449,977	92,741,344	692,099,585
#3	0.21 – 0.4	0.28	17	0.28	9,016,520	67,287,460	153,280,833	1,143,886,813
#4	0.41 – 0.8	0.53	16	0.53	17,066,984	127,365,549	273,071,736	2,037,848,777
#5	0.81 – 1.6	1.1	14	0.14799	27,233,869	203,237,831	381,274,172	2,845,329,640
#6	>1.6	2.06	5	0.67693	124,573,976	929,656,536	622,869,879	4,648,282,679
							1,568,964,599	11,708,691,039

6.3 – Monitoring Program Summary

6.3.1 Program Rationale

The Representative Monitoring Program and the Field Screening Program comprise a two-fold approach to monitoring the MS4. These programs will establish a base line from which to monitor the effectiveness of the SWMP. Table 2 on page 10 illustrates the calendar schedule specified in the Permit for these programs. The Field Screening Program, which serves to identify illicit discharges and quantify the quality of industrial discharges to the MS4, is discussed in Section 5.6 of this report.

The Representative Monitoring Program represents a shift from in-system sampling and land-use based characterization to in-stream sampling with a regional perspective. In Part 1 of the original Permit application, six points were identified as being representative of either residential, commercial or industrial land uses in the City. The data collected and presented in Part 2 of the application indicates that pollutant levels in storm water from these land uses are generally below the Nationwide Urban Runoff Program (NURP) event mean concentrations for the respective land use types. It was proposed to use six in-stream locations representative of the City's entire watershed to better measure the effectiveness of the SWMP. These six in-stream locations are near the City limits and emphasize the cumulative effect of storm water runoff from the minor watersheds identified in Parts 1 and 2 of the Permit application. These locations are listed below and shown in Figure 18.

1. **South Creek at Golden.** This location drains mostly residential.
2. **Jordan Creek at Bennett.** This location drains the oldest and most industrialized portion of the City.
3. **Wilsons Creek at Farm Road 146.** This location drains approximately 40% of the City, including the oldest portion of the City.
4. **Galloway at Highway 60.** This location drains an area of the City representing all the land uses i.e. small to large residential lots, commercial, and manufacturing.
5. **Jones Spring.** This location drains a large sinkhole cluster area of the City.
6. **Pea Ridge at Farm Road 102.** This location drains the northern portion of the City and has Interstate-44 running through the drainage area.



Figure 18 – Locations of in-stream sampling sites

The Representative Monitoring Program consists of two types of sampling events:

- ▶ Ambient sampling representing the quality of the stream base flow, to be completed at each of the six in-stream locations during the second weeks of November, March, and May.
- ▶ Wet-weather sampling, representing the influence of storm water runoff on water quality, to be completed once at each of the six in-stream locations during the period of March 1 through May 31.

6.3.2 Monitoring Results

The ambient sampling events were completed on November 10, March 9, and May 10. The wet-weather sampling event was completed on March 25. Samples were analyzed at the City's Wastewater Laboratory at the Southwest Wastewater Treatment Plant. The results for the conventional parameters listed in Part V. of the Permit are shown in Table 9. All of the results for the metals, pesticides, volatile organics (method 624 & 603), and acid/base neutral organics (method 625) listed in Part V. of the Permit were below detectable limits. One set of the lab analysis sheets showing the detectable limits for these parameters is included in Appendix B. The lab analysis sheets for the individual sampling events are available upon request. As noted in Table 9, results for TKN were not available for South Creek, Galloway Creek, and Wilsons Creek for the November 10 sampling event due to laboratory equipment error.

Table 9 – Representative Monitoring: Ambient and Wet-Weather Sample Results

Site	Date	pH	BOD	COD	TSS	TDS	Ammonia nitrogen (NH3-N)	Nitrate/Nitrite	Total Kjeldahl Nitrogen	Dissolved Phosphorus	Total Phosphorus	Cyanide	Phenolics	Oil & Grease	Fecal Coliform	Fecal Strep
SC	11/10	7.22	<1	8	<1	213	<0.1	2.63	N/A*	0.05	1.08	<0.005	<0.01	<10	30	120
	3/9	7.56	2	50	7	280	<0.1	1.71	0.66	0.08	0.62	<0.005	<0.01	36	30	10
	3/25	7.54	<1	15	2	227	<0.1	1.06	0.61	0.02	0.33	<0.005	<0.01	2	20	10
	5/10	7.02	<5	18	6	240	<0.1	0.46	0.9	0.07	0.12	<0.005	<0.01	<1	50	50
JC	11/10	7.35	<1	4	<1	427	0.29	4.94	N/A*	0.02	0.74	<0.005	<0.01	<10	475	220
	3/9	7.74	1	2	3	453	<0.1	3.02	0.64	0.09	0.49	<0.005	<0.01	2.2	30	<10
	3/25	7.1	<1	5	2	253	<0.1	1.57	0.76	<0.01	0.34	<0.005	<0.01	<1	300	90
	5/10	7.21	<5	21	<1	453	0.12	2.18	1.3	0.03	0.07	<0.005	<0.01	<1	270	110
WC	11/10	7.67	<1	4	<1	387	<0.1	2.27	N/A*	0.03	0.82	<0.005	<0.01	<10	70	100
	3/9	7.83	1	6	2	387	<0.1	3.12	0.58	0.13	0.49	<0.005	<0.01	2	20	10
	3/25	7.84	<1	21	2	287	<0.1	2.05	0.58	<0.01	0.34	<0.005	<0.01	<1	230	70
	5/10	7.5	<5	12	1	413	0.1	2.12	1.09	0.01	0.07	<0.005	<0.01	<1	185	60
GC	11/10	7.62	<1	11	<1	280	<0.1	0.43	6.12	0.05	0.84	<0.005	<0.01	<10	85	100
	3/9	7.94	<1	16	4	306	<0.1	3.23	0.28	0.14	0.48	<0.005	<0.01	<1	30	40
	3/25	7.73	<1	4	<1	253	<0.1	2.3	0.69	<0.01	0.32	<0.005	<0.01	<1	10	40
	5/10	7.54	<5	17	2	347	<0.1	2.32	0.78	0.02	0.06	<0.005	<0.01	<1	70	190
JS	11/10	6.89	<1	6	<1	387	<0.1	2.51	4.26	0.03	0.9	<0.005	<0.01	<10	145	100
	3/9	6.61	<1	12	2	346	<0.1	4	0.4	0.11	0.48	<0.005	<0.01	1	70	20
	3/25	6.61	<1	14	<1	360	<0.1	3.72	0.44	0.02	0.32	<0.005	<0.01	<1	10	<10
	5/10	6.42	<5	6	<1	359	<0.1	2.94	0.84	0.03	0.07	<0.005	<0.01	<1	20	<10
PR	11/10	7.38	<1	41	<1	400	<0.1	0.59	0.77	0.06	0.79	<0.005	<0.01	<10	80	190
	3/9	7.8	1	7	1	406	<0.1	3.19	0.62	0.11	0.48	<0.005	<0.01	1	500	190
	3/25	7.5	<1	7	6	306	<0.1	1.85	0.84	<0.01	0.34	<0.005	<0.01	<1	160	230
	5/10	7.25	<5	7	<1	413	<0.1	2	0.82	0.05	0.08	<0.005	<0.01	<1	300	270

SC = South Creek at Golden Avenue GC = Galloway Creek at Highway 60
 JC = Jordan Creek at Bennett Street JS = Jones Spring
 WC = Wilsons Creek at Farm Road 146 PR = Pea Ridge Creek at Farm Road 102

All parameters are measured in mg/l, except Fecal Coliform and Fecal Strep are colonies/ 100ml.
 See Table 6 for definitions of abbreviated parameters.
 *Analysis for TKN was not available due to equipment error.

6.3.3 Results Discussion

The sample analysis results were evaluated through comparison with the *10 CSR 20-7.031 Water Quality Standards*. Jordan Creek, Pea Ridge Creek, Galloway Creek, Wilsons Creek, and South Creek are all classified as general warm-water fisheries with use designations for Livestock & Wildlife Watering and Protection of Warm Water Aquatic Life and Human Health – Fish Consumption. Pea Ridge Creek is additionally designated as a Drinking Water Supply. Jones Spring is not specifically classified. For the purpose of this evaluation, the criteria for Groundwater was used for evaluation of results from Jones Spring as well as criteria for Livestock & Wildlife Watering and Protection of Warm Water Aquatic Life and Human Health – Fish Consumption as Jones Spring contributes surface water to a tributary of Pearson Creek.



Figure 19 - In-stream sampling of South Creek

pH

Measurements of pH were taken in-stream at the time of sampling with an Oakton pH/DO meter. All of the pH measurements were within the range of 6.5-9.0 specified in the water quality standards with the exception of Jones Spring on May 10 with a pH measurement of 6.42.

Oil & Grease

All of the sample analysis results for oil & grease met the water quality standard of 10mg/l with the exception of the result of 36mg/l for South Creek on March 9. The sampling event on March 9 was not a wet-weather event; the results for South Creek may indicate an incident of illegal dumping in the creek.

BOD and COD

The levels for BOD and COD should not cause dissolved oxygen levels to fall below the minimum of 5mg/l listed in 10 CSR 20-7.031 for warm-water fisheries. Dissolved oxygen measurements were taken in-stream at the time of sampling with an Oakton pH/DO meter. The levels ranged from 6.89 to 15.39mg/l.

TSS and TDS

The water quality standards include a narrative standard for Solids to protect the beneficial uses of the stream. Other water quality information was looked at for comparison with the sampling results. According to the Michigan Department of Environmental Quality, waters with levels of TSS below 20mg/l are generally considered clear.¹³ The sampling results for TSS range from <1 – 7mg/l. The EPA secondary standard for TDS in drinking water is 500mg/l. All of the sampling results for TDS were below 500mg/l.

Nitrogen and Phosphorus

With the exception of Pea Ridge Creek, the sampling sites are in the James River watershed. The James River Total Maximum Daily Load (TMDL), issued by the Missouri Department of Natural Resources in May 2001, sets limits of 0.075 mg/l for total phosphorus and 1.5 mg/l for total nitrogen for all classified streams that are tributaries of the James River. Total nitrogen is defined in the James River TMDL as kjeldahl nitrogen plus ammonia nitrogen. In the parameters listed in the Permit, total kjeldahl nitrogen is equivalent to this definition of total nitrogen.

¹³ www.deq.state.mi.us/documents/deq-swq-npdes-TotalSuspendedSolids.pdf

All of the results meet the TMDL limit for total nitrogen with the exception of Galloway Creek and Jones Spring on November 10. The results from May 10 for Jordan Creek, Wilsons Creek, Galloway Creek, and Jones Spring meet the TMDL limit for total phosphorus.

Cyanide and Phenolics

The water quality standards for cyanide and phenol are 0.005mg/l and 0.1mg/l respectively. All of the results met these water quality standards.

Fecal Coliform and Fecal Strep

The water quality standard of 200/100ml for fecal coliform only applies to waters designated for Whole Body Contact Recreation and during periods when the waterway is not affected by storm water runoff. The sampled streams are not designated for Whole Body Contact Recreation.

Analysis of Averages

In order to identify trends in the data, total averages for each of the parameters were calculated along with sampling event and site averages, as shown in Table 10. The averages for the wet-weather sampling event on 3/25/04 were generally lower or equal to the ambient sampling event averages. The total averages for all the sampling events and the averages for the wet-weather sampling event on 3/25/04 were compared with national data collected for the Nationwide Urban Runoff Program (NURP) in the early 1980s. All of these results indicated better water quality than the NURP event mean concentration averages¹⁴ except for the results for nitrate + nitrite. Although no single sampling location exhibited higher levels for all parameters when compared to the other locations, the sample results from South Creek most frequently showed higher levels, specifically for COD, TSS, total phosphorus, and oil & grease. As noted in the discussions of these parameters, the results for COD, TSS, and oil & grease met water quality standards and indicators.

Table 10 – Representative Monitoring: Sampling Results Averages

Parameter	Ambient Averages	Total Averages	Sampling Event Averages				Sampling Site Averages					
			11/10/03	3/9/04	3/25/04	5/10/04	SC	JC	WC	GC	JS	PR
pH	7.35	7.36	7.32	7.58	7.39	7.16	7.3	7.35	7.71	7.71	6.58	7.48
BOD	<2	<2	<1	<1	<1	<5	<2	<2	<2	<2	<2	<2
COD	14	13	12	16	11	14	23	8	11	12	10	16
TSS	<2	<2	<1	3	<2	<2	<4	<2	<2	<2	<1	<2
TDS	363	343	349	363	281	378	240	397	369	297	373	381
NH3-N	<0.11	<0.11	<0.13	<0.1	<0.1	<0.1	<0.1	<0.15	<0.1	<0.1	<0.1	<0.1
Nitrate + Nitrite	2.43	2.34	2.23	3	2.09	2	1.47	2.93	2.39	2.07	3.29	1.91
TKN	1.33	1.14	3.72	0.53	0.65	0.96	0.72	0.9	0.75	1.97	1.49	0.76
Dissolved P	0.06	<0.05	0.04	0.11	<0.07	0.04	0.056	<0.04	<0.05	<0.06	0.05	<0.06
Total P	0.48	0.44	0.86	0.51	0.33	0.08	0.54	0.41	0.43	0.43	0.44	0.42
Cyanide	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Phenolics	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Oil & Grease	<6	<5	<10	7.2	<1	<1	<12	4	<4	<3	<3	<3
Fecal Coliform	137	133	148	113	122	149	33	269	126	49	61	260
Fecal Strep	<100	<94	138	47	<75	<115	48	<108	60	93	<35	220

Site Abbreviations: SC = South Creek at Golden Avenue; JC = Jordan Creek at Bennett Street; WC = Wilsons Creek at Farm Road 146; GC = Galloway Creek at Highway 60; JS = Jones Spring; PR = Pea Ridge Creek at Farm Road 102

Parameter Abbreviations: BOD = Biochemical Oxygen Demand; COD = Chemical Oxygen Demand; TSS = Total Suspended Solids; TDS = Total Dissolved Solids; NH3-N = Ammonia Nitrogen; TKN = Total Kjeldahl Nitrogen; P = Phosphorus

¹⁴ As listed in City of Springfield, Missouri Stormwater NPDES Permit Application Part 2, 1993

6.3.4 Record of Personnel Participation in Collection of Samples

<u>Sampling Event</u>	<u>Personnel</u>
11/10/03	Carrie Lamb, Environmental Assistant, Storm Water Services Division, Public Works
3/9/04	Carrie Lamb, Environmental Assistant, Storm Water Services Division, Public Works
3/25/04	Carrie Lamb, Environmental Assistant, Storm Water Services Division, Public Works
5/10/04	Carrie Lamb, Environmental Assistant, Storm Water Services Division, Public Works

6.3.5 Storm Event Data

The storm event data for the wet-weather sampling event on March 25 is reported as specified under Part V.A.2 of the Permit. The storm event sampled occurred on March 24-25. According to data from the National Weather Service station at the Springfield-Branson Regional Airport, the event total rainfall was 0.23 inches occurring over 4 hours. The previous measurable storm event occurred on March 15 with a total rainfall of 0.20 inches ending approximately 9 days before the sampled storm event. The total discharge volumes at each of the six sampling locations for the sampled storm event of March 24-25 were estimated using the SCS Runoff Curve Number outlined in Section 6.2. The total discharge volumes are listed in Table 11 along with the calculation values used. The total discharge volume for Jones Spring was calculated by using a basin area of 48 contributing sinkholes and assuming that all water entering these sinkholes discharges at Jones Spring.

Table 11 – Discharge Volumes for Wet-Weather In-Stream Sampling Event

Outfall Location	Impervious %	Impervious CN	Pervious cover type %	Pervious CN	Average CN	Runoff "Q" (inches)	Basin Area (acres)	Discharge Volume (cubic feet)	Discharge Volume (gallons)
South Creek at Golden	25	98	75	75	80.75	0.02850	3,305	341,878	2,551,329
Jordan Creek at Bennett St.	30	98	70	75	81.9	0.02249	8,780	716,947	5,350,350
Wilsons Creek at FR 146	28	98	72	75	81.44	0.02483	19,174	1,728,322	12,897,926
Galloway Creek at Hwy 60	25	98	75	72	78.5	0.04171	4,323	654,503	4,884,350
Jones Spring	23	98	77	76	81.06	0.02683	1,832	178,402	1,331,355
Pea Ridge Creek at FR 102	22	98	78	72	77.72	0.04672	5,497	932,189	6,956,635

6.4 Floatables Monitoring

Two locations have been designated for removal of floatables as required in Part V.B. of the Permit. These locations were identified as points of significant accumulation of debris based on the experience of Public Works personnel and the frequency of citizen requests for cleaning at these locations. The City's new work order system was installed in December 2003. Records from December 2003 through June 2004 show that 18 cubic yards of floatables were collected from location 1 and 20 cubic yards from location 2.

- ▶ Location 1 – Channel on the east side of Grant Avenue approximately 100 feet north of Portland Street
- ▶ Location 2 – Detention basin at the southwest corner of Carleton Street and Bothwell Avenue



Figure 20 - Floatables Monitoring Location 1 at Portland and Grant



Figure 21 – Floatables Monitoring Location 2 at Carleton and Bothwell

6.5 Biological Sampling

The City has developed a program of periodic biological assessments of two urban streams as required in Part V.C. of the Permit. Biological assessments will be conducted at the following locations: (1) Jordan Creek at Bennett Street and (2) Galloway Creek at James River Freeway. The City has contracted with Southwest Missouri State University to perform the biological assessments. As required in Part V.D.2.e of the permit, an explanation and rationale for the program is included in Appendix B.

7.0 Summary of Modifications to the Storm Water Management Program

While it is anticipated that the current SWMP, which has served the public well, will follow the outlined activities of the Permit, City staff will continue to evaluate potential BMPs to further enhance water quality of the MS4. The activities required during year three of the Permit will be added to the SWMP. Beyond these additions, no modifications to the SWMP outlined in the Permit are proposed at this time.

8.0 Fiscal Analysis

Expense Item or Program	Funding Source ¹⁵	Actual Expenses FY 02/03	Actual Expenses FY 03/04	Est. Budget FY 04/05
Hard Costs¹⁶				
Staff: 2 full-time staff, mgmt and admin staff, 1 intern	SWBI and GF	\$76,000	\$82,000	\$100,000
Supplies & Equipment	SWBI and GF	\$10,000	\$3,000	\$10,000
GIS hardware/software	SWBI and GF	\$4,000	\$5,000	\$6,000
Training and Professional Services and Studies	SWBI and GF	\$30,000	\$43,000	\$60,000
Lab Services (sample analysis)	SWBI and GF	\$44,000	\$44,000	\$44,000
Education Materials/Supplies	SWBI and GF, SSF, TF, LTF	\$1,869	\$2,500	\$3,000
Total		\$165,869	\$179,500	\$223,000
Soft Costs¹⁷				
Water Quality Improvement Projects	SWBI	\$653,615	\$800,000	\$1,000,000
Vegetation Management of Waterways & Basins	DBF, TF, GF	\$543,975	\$209,187	\$572,576
Tree Planting & Maintenance	GF	\$496,450	\$618,235	\$547,931
Solid Waste Division Education Program w/ water quality emphasis	LTF ¹⁸	\$38,900	\$40,870	\$43,339
Household Chemical Collection Center	SS (50%), LTF (50%)	\$104,500	\$111,713	\$104,500
Yardwaste Recycling Center	LTF	\$348,000	\$238,977	\$355,590
Infiltration/Inflow Program	SSR	\$1,286,471	\$783,150	\$800,000
Floodplain Acquisition Program	SWBI	\$856,750	\$488,585	\$500,000
Debris collection – grate, waterway, bridge, and sinkhole routes	TF	\$30,000	\$98,382 ¹⁹	\$100,000
Street Cleaning	TF	\$491,000 ²⁰	\$462,842	\$481,450
USGS Coop. Stream Gauge Project	SWBI	\$17,300	\$17,300	\$17,300
Watershed Committee of the Ozarks	GF	\$41,000	\$41,000	\$41,000
James River Basin Partnership	GF	\$5,000	\$5,000	\$5,000
Total		\$4,912,881	\$3,915,241	\$4,568,686
Grand Total		\$5,078,750	\$4,094,741	\$4,791,686
2-Year Total Expenses			\$9,173,491	

¹⁵ **SWBI** – Storm Water Bond Issue funded by Level Property Tax; **GF** – General Fund; **SSF** – Sanitary Services Fund; **TF** – Transportation Fund; **LTF** – Landfill Tipping Fees; **DBF** – Detention Buyout Fund; **SSR** – Sanitary Sewer Revenue

¹⁶ Hard costs are expenses for activities conducted solely for the purpose of compliance with Permit requirements.

¹⁷ Soft costs are expenses for activities that are part of the Permit requirements and/or overall SWMP, but would be conducted by the City regardless of the Permit. Expenses do not include capital purchases.

¹⁸ A small portion of funds for the Solid Waste Management Division Education Program, HCCC, and YRC comes from donations and from the sale of YRC products.

¹⁹ The actual expenses for the fiscal year are an estimate based on expense records for December- June. Additionally, MoDot spends approximately \$10,000 on curb inlet cleaning of state-maintained thoroughfares within the City limits.

²⁰ Includes personnel, services, and supplies for all street cleaning activities including sweeping, debris pickup, grate cleaning, and vacuuming ditches. Additionally, MoDot spends approximately \$30,000 on sweeping state-maintained thoroughfares within the City limits.